SERVICE MANUAL

FOR
BRUSHLESS GENERATORS
2.2 KW THROUGH 15 KW

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SAFETY PRECAUTIONS

This service manual describes only the methods of repair concerning the generator. Always refer to the engine manufacturer's repair manual for its own repair procedures.

Read through this manual. Then carefully follow all recommendations and safety precautions to keep the generator functioning properly and to avoid any serious body injury.

WARNING!

MOVING PARTS! Keep hands, loose clothing, necktie, hair or test leads well away from all moving items as serious injury could result from entanglement. Never run generator or engine with guards or protective covers removed.

WARNING!

LETHAL EXHAUST GAS! The running engine releases deadly carbon monoxide as part of the normal exhaust gas. This poisonous carbon monoxide gas is particularly dangerous because it is odorless and colorless. Never operate the generator set inside a building unless this exhaust gas is safely piped outside and the proper amount of free fresh air is allowed to enter, ventilate, and leave the building. Never operate engine where exhaust gas may travel inside occupied building. Avoid breathing fumes when working on or near generator set. Use extreme caution when operating gen-set with LPG, PROPANE, or NATURAL GAS fuel. Always consult your local gas company and fire department before operation is begun to confirm safe installation and operating conditions.

WARNING!

BURN HAZARD! All engine parts and muffler will get extremely hot while running. Complete engine should be allowed to cool down before set is worked on and repaired.

WARNING!

HIGH VOLTAGE! The job function of the generator is to produce electricity, and whenever this energy is present, there is the potential of electrical shock and death by electrocution. No one, except trained and qualified repairmen, should be allowed to work on the generator. Keep everyone, especially children, away from unguarded or running set. Wiring should be inspected frequently. Replace any leads that are frayed or in poor condition. Be sure that generator and plugged in equipment are properly grounded. Do not operate electrical equipment when standing in water, wet ground or when your hands are wet.

WARNING!

FIRE HAZARD! Avoid flash fire. Do not smoke or allow flame or spark near engine. Never try to fill engine fuel tank while the engine is running. Safely empty fuel tank before tipping engine to drain oil. Always use a safe, portable, vented fuel tank that is designed for the purpose of storing or hauling fuel when filling the engine mounted fuel tank. Wipe up any fuel spillage before operating engine. Never allow children or other unqualified people around or near this equipment.

WARNING!

DANGEROUS FUELS! Use extreme caution when handling, storing and using fuels. All fuels are explosive in a vapor condition. Store all types of fuel in a well ventilated area away from all flames, sparks, and children. Never add fuel to tank while engine is running since spilled fuel may ignite from ignition spark or hot engine parts. Keep fuel lines in tight and in good condition. Don't use rigid fuel lines in place of the original flexible fuel lines. Do not operate generator set when fuel spillage, fuel leakage or electrical sparks are noticed.

GASOLINE - Always store gasoline in approved red containers that are clearly marked "gasoline" and having proper venting. Don't store gasoline in occupied building.

WARNING!

DANGEROUS ACID! Avoid all contact with battery electrolyte. It contains a dangerous acid which can burn skin, burn holes in clothing, and cause permanent damage to eyes. Always wear protective safety goggles when working around batteries. If battery electrolyte is splashed in the eyes or on skin, immediately flush area for 30 minutes with large quantities of clean fresh water. Seek immediate medical aid in event of eye contact. Never add battery acid to a battery that is in service as it may result in dangerous splattering of electrolyte.

WARNING!

ELECTRICAL SHOCK! A battery can cause electrical burns and shocks. Use extreme care when working on batteries to avoid electrical connections through tools, wristwatches, rings, or any other type of jewelry.

WARNING!

EXPLOSIVE BATTERY GASES! A battery under charge can emit highly explosive gases. Do not smoke or permit flame or spark near battery, especially when it is being charged. Avoid contacting battery terminals with tools to prevent burns or sparks that could cause an explosion. Remove all jewelry before handling battery to avoid burns. Battery compartments should be well ventilated to prevent accumulation of explosive gases.

WARNING!

HIGH VOLTAGE! The capacitor contains high voltage. Use extreme caution when handling the capacitor as electrical shock can result. Always discharge capacitor before handling by placing an insulated handle screwdriver across capacitor terminals.

WARNING!

ELECTRICAL SHOCK! When "flashing" the generator by applying 12 volts DC battery voltage to capacitor terminals, be careful to avoid touching any bare and exposed battery and capacitor terminals as dangerous electric shock is present.

WARNING!

DANGER OF ELECTROCUTION! Some of the test procedures require that the generator set be running while tests are performed. Extreme caution must be used when making these tests as potential electric shock is present.

Always use factory supplied, original parts. Substitution parts often cause more failures resulting in equipment down-time, due to lower values of look-alike components.

You can rely on 24-hour shipment of common repair parts of these “brushless” generators.

Call us and ask for our parts manager to obtain any part you may require.

WARRANTY CLAIM: Notify factory before any attempt is made to repair a Gen-Set. Defective parts must be sent to us for inspection before warranty claim is approved.

This manual and the manufacturer cannot possibly anticipate every possible happening that might involve a hazard. The listings, warnings, and cautions in this manual and on tags and decals affixed to the equipment are, therefore, **NOT ALL INCLUSIVE**. If a certain procedure, work method, test method and operating procedure that are not recommended by this manual and by this manufacturer is used, you must assume all responsibility that it is safe for you and for all others. You must also be sure that the generator will not be harmed or damaged or made unsafe by the procedure, work, or method you have chosen. If you modify or change this equipment in any way from the original design, you must assume all responsibility for its safe operation.

DESCRIPTION OF A-C GENERATOR OPERATION

A-C GENERATOR

The A-C generator converts the mechanical energy from the engine to electrical power. There are four major components involved in the brushless "Power-Assist" generator set. The construction of each major part is described in detail.

POWER GENERATION

The rotor windings are initially charged with a D-C voltage and permanently retains a residual magnetic flux. During start-up, an initial flow of electric current is induced in the winding of the capacitor coils (located in the stator). The lines of magnetic flux, from the charged rotor, are cut by the stator field coil windings. This induced flow of current and voltage is very low.

As the engine increases in speed, the voltage induced in the capacitor windings rises. An alternating current flows in these windings. The rising and falling magnetic field from this current is cut by the field coils in the rotor, inducing an excitation voltage. A diode (rectifier) in the rotor field winding rectifies the current from A-C to D-C. The D-C current in the rotor field generates its own magnetic field which sweeps past the main power windings in the stator. This sweeping magnetic field induces the rated voltage in the main winding as long as the rotor is turning at the correct speed.

When the electric load is connected to the main power winding, the capacitor coil circuit will tend to prevent the main winding voltage from falling; therefore, acting as a capacitor regulator.

This innovative voltage stabilizing effect is called "Power-Assist" and is an exclusive design with these products.

GENERATOR CONSTRUCTION

Each generator component is described in detail. (See Figure 1)

THE ROTOR

The engine end of rotor inner shaft is tapered and is connected directly to the male taper of engine crankshaft. This end is supported by the engine crankshaft ball bearing. The opposite end of rotor is supported by a ball bearing in the bearing bracket. There are two individual coils wound on the rotor. These two windings create a permanent magnetic field for the main stator power winding. When the gen-set is working with the capacitor removed, this rotor winding will generate approximately 8 - 12 VAC at 120 VAC normal output and 16 - 24 VAC at 240 VAC normal output in main winding, due to what is called “Residual Magnetism”.

THE STATOR

The stator is a cylinder and the inside diameter is slotted lengthwise. The windings of both main power and capacitor coils (called exciter windings) are placed in these stator slots. The main power windings are connected directly to the output receptacles. The exciter winding will produce power for the rotor field and are connected directly to the capacitor.

THE CAPACITOR

This device is connected in series with the exciter winding, and its only purpose is to act as a voltage regulator, preventing voltage drop when load is applied.

THE DIODE

Two diodes (rectifiers) form a full wave rectifier circuit to convert the induced A-C current to D-C current for full rotor field excitation. Both diodes are located on a disc heat-sink in the cooling air flow and are oversized seven times required capacity for complete fail-proof design.

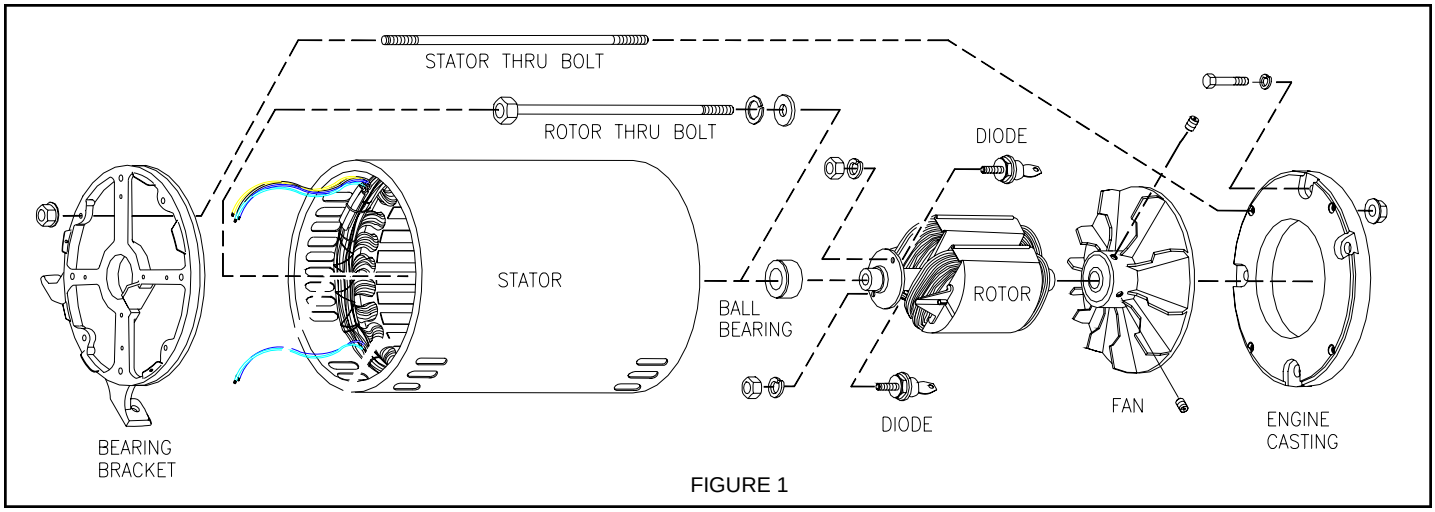


FIGURE 1

SCHEDULED MAINTENANCE

Scheduled maintenance is "preventative maintenance". Major repairs can be avoided by correcting problems when they are small. Always look for signs of potential trouble, such as loose electrical connections, loose hardware or loose mechanical connections. Loose screws and bolts, bad fuel connections. Always test the GFCI receptacles (if your gen-set has them) before each use.

When running the generator set, note any unusual noises or unusual smells. Always follow all safety precautions listed in the front of this manual. Refer to table on this page for scheduled maintenance of the generator. Perform each function at the indicated time interval. Refer to engine manual for its individual service requirements.

ITEM OF INSPECTION AND SERVICE	BEFORE EACH START	EVERY 50 HOURS	EVERY 200 HOURS
Operate in only dry, well ventilated areas.	x		
Inspect for broken or dirty receptacles.	x		
Remove inspection cover and view windings for burned or dirty windings.		x	
Tighten all stator thru-bolts, rotor thru-bolts.			x
Inspect wiring for frayed or damaged insulation. Tighten all screws on all receptacles. Inspect connections to capacitor. They must be tight.			x
Remove all ground wires, clean wire terminals and ground location. Re-assemble ground wire.			x

GENERATOR REPAIR PROCEDURES

GENERAL

When repairing the generator, always consider the simplest possible causes first. Narrow the problem down to a specific functional system. For a generator to work properly, all internal and external parts must be clean. All electrical connections must be tight. If the generator produces no electrical power, check the following possible causes in the exact sequence of (10) repair steps, beginning with the most frequent problem, before the gen-set is dis-assembled.

STEP 1. Engine Speed: Improper low engine speed setting is very common and results in being the main problem in a no voltage condition. This should be the first item to check. Determine the engine speed at **no load** applied to generator with a tachometer or other qualified speed indicator. The engine must be running at 3750 RPM (± 60 RPM) or in the case of a special 50 cycle winding, the running speed must be at 3150 RPM (± 50 RPM) for proper voltage output.

The brushless "Power-Assist" winding is designed to produce no voltage output if engine speed is reduced 15% or more (3100 RPM at normal speed of 3750 RPM 60 hertz or 2600 RPM at normal speed of 3150 RPM 50 hertz) below required speed. This design feature eliminates the problem of low voltage output at low speeds which is a common problem with competitor's generators and which may result in damage to the plugged-in electric load.

Proper speed setting can also be identified by no load voltage output of 122 - 125 volts or no load frequency output of 62 hertz. If speed setting is proper and not the cause of no voltage output, proceed to the next repair step, #2.

STEP 2. Open Circuit Breaker: The A-C mainline circuit breaker acts to protect the main power winding. It will trip open immediately upon short circuit and trip open within 30 seconds at approximately 15% overload. To restore A-C output, close circuit breaker. Reduce the amount of electric load if breaker continues to trip open. If generator has no electric load applied and breaker continues to trip, replace defective breaker.

If you are operating the gen-set when ambient temperatures are higher than 105 F, the thermal breakers will automatically trip as a normal function. Do not operate generator in these hot conditions. If the circuit breaker is determined not to be the cause, proceed to the next repair step, #3.

STEP 3. Open or Shorted Capacitor:

Our voltage regulating capacitors are of one common size, 50 mfd at 440 volts. They can be used in any size generator for complete interchangeability. If this capacitor is open or shorted near to no voltage output will result. Always handle or test the capacitor when the engine is stopped. Extremely high voltage is present at the capacitor terminals while generator is in use and these terminals should not be touched as a potential electric shock condition exists. Also, when engine is stopped, the capacitor will still contain high voltage. Use extreme caution when handling capacitors. A potential shock condition still exists if safe handling procedures are not used. Always discharge the capacitor before handling by placing a conductor, such as an insulated handle screwdriver, across the capacitor terminals while holding on to insulated handle only. This will short out the voltage stored in capacitor, thus discharging the capacitor. A loud audible noise will result when capacitor is discharged.

With the engine stopped, remove the protective plastic cover from capacitor lead connections. Disconnect both red capacitor winding leads from the capacitor. Check the capacitor "charge and discharge" readings using an ohmmeter on the RX-100 scale. (See Figure 2)

When the ohmmeter leads are placed on the capacitor terminals, a meter deflection should be seen (charging) followed by a slow return to infinity (discharging). Reverse the ohmmeter leads and repeat the procedure for the same results. No meter deflection or continuing continuity indicates an open or shorted capacitor.

All capacitors have an internal, built-in circuit breaker. If capacitor becomes "shorted", this internal circuit breaker trips open and causes the entire top portion (where terminals are located) to become extremely convexed or to push outward. When this happens, the capacitor is bad and must be replaced.

CAUTION: Inspect connection of red wires to capacitor terminals. They must be soldered rigidly tight. Repair or replace any loose or poor connections. If there is no method to check the capacitor, check the Yellow Pages and call any electric motor repair shop. They have the equipment to test capacitors. If the capacitor is determined not to be the cause, proceed to the next repair step #4.

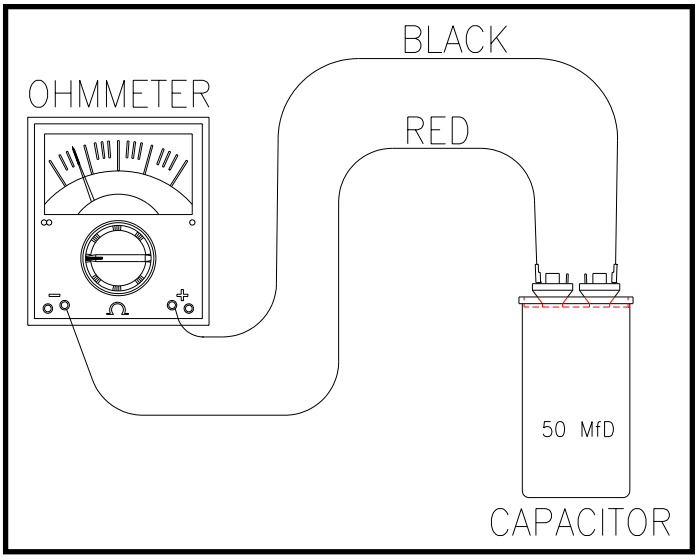


FIGURE 2

STEP 4. Loss of Rotor Residual Magnetism-Flashing Field: The rotor windings have been "charged" with a powerful D-C current, and it will hold a residual magnetism within its metal lamination stack. When every component in the rotor system (rotor windings and diodes) are good and engine speed is correct, an A-C voltage of 8 -12 volts on 120 VAC and 16 - 24 volts can be measured at the 240 VAC load lines of stator power output leads. With no voltage present, or one-half or less of above designated voltage, it can be presumed that residual voltage is lost, and the rotor winding must be re-energized or "flashed".

If the rotor has been removed or the generator has been stored for over six months, the rotor's magnetism may be lost. As the generator is brushless, the field cannot be "flashed" in the normal way.

The residual magnetism can sometimes be restored by connecting a full electric load to the receptacles and then manually increase engine speed to approximately 4500 RPM for two seconds. This allows the compounding system to assist the full load circuit with a resulting increase in the effective residual voltage. This is the quick method and sometimes it does not work. If residual magnetism of 4-6 volts is not restored, proceed to actual "flashing" of the rotor winding.

The generator set should be run at normal no-load speed, A 12 VDC battery should then be instantaneously "flashed" ("touched" for only one second) across the capacitor terminals. Polarity is of no concern. The red leads should remain connected to the capacitor. The output voltage should then build up to normal levels. (See Figure 3.)

Caution: Flashing the field has restored voltage output; but when set is stopped and restarted with resulting no voltage output, then check engine speed as it is too low.

A potential shock hazard exists when handling battery and battery jumper leads. Never wear jewelry, or use tools, or metal items that may make contact across battery terminals. Review safety rules at the beginning of this manual.

If residual magnetism was not the problem, proceed to next step, #5.

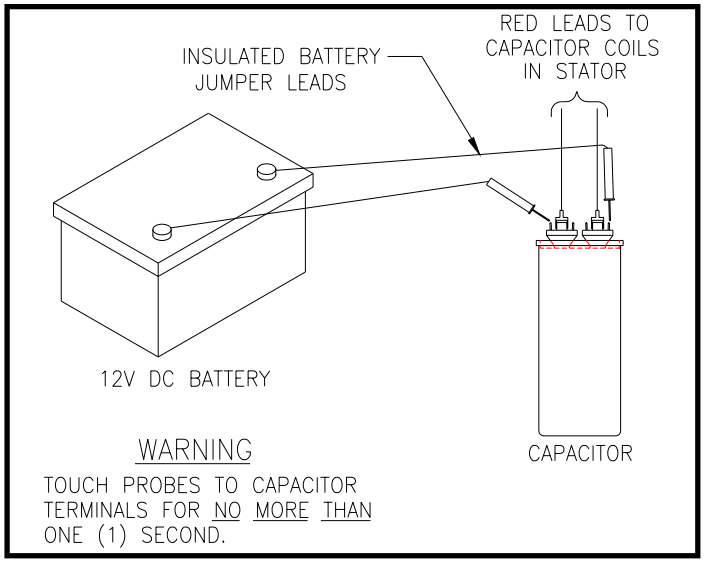


FIGURE 3

STEP 5. Receptacle Panel Wiring: Inspect the receptacle panel for worn or loose wires. Make sure all wires are secure and tight at the screws of receptacles. Do not allow wires to be pinched, kinked or damaged in any way. Inspect for tight connections at circuit breakers, capacitors, and all receptacles. Replace any broken component. Test any GFCI receptacles by use of its built-in test and reset buttons. Panel wiring must conform with diagrams as shown on Page 28 through 33. If panel wiring checks good, proceed to next repair step, #6.

STEP 6. Open, Shorted, or Grounded Stator Main Windings: The stator is the outside stationary winding as shown in Figure 1. It consists of copper wire laid in a steel laminated frame. To remove stator assembly, follow disassembly instructions, part #1 through #5, on page 10.

The stator windings form two main poles and have four coils per pole with two lead wires connected to each pole winding. The large black lead wires are numbered #1 and #2 for one field pole; #3 and #4 for the other field pole. To test the main power winding, disconnect all lead wires. Set ohmmeter to lowest OHM x 1 scale. Place one meter test lead on #1 lead of stator winding and the other test lead on #2 lead of stator winding. (see fig. 4) Then record this resistance value. Measure resistance values of leads #3 and #4 of the second main pole winding. Record all values and check them with resistance chart on Page 8.

When testing for resistance, also test for grounded field coils. One ohmmeter test lead stays on field coil lead while the other test lead is touched to a good "ground" surface of the metal frame bracket holding these coils. A reading of the ohmmeter indicates a bad condition of a ground field coil and stator assembly should be replaced.

CAUTION: Make sure all leads are disconnected and free. The #2 & #3 main field coil leads are intentionally grounded to form a neutral and will give meter a false reading.

Grounded field coils indicate defective stator.

No reading or resistance values when testing between two lead wires (#1 and #2 or #3 and #4) indicate an open stator, and it should be replaced.

Check all meter resistances with chart resistances on Page 8. A quick test for the entire stator winding assembly is to disconnect the two red wires from the capacitor. With capacitor out of the circuit, connect 12 VDC to these two red wires and start the gen-set. If you measure 30-40 VAC from 240 volt receptacle with an AC voltmeter, the main winding, the rotor, and the capacitor are good; but the exciter winding (wound on top of the main winding) is bad. This requires a complete replacement of stator assembly. If stator main winding tests good, proceed to next repair step, #7, for further stator tests.

STEP 7. Open, Shorted, or Grounded Stator Exciter Winding: The exciter winding is laid directly on top of main winding inside stator assembly. It has two coils per pole and is connected to two red lead wires. Same test procedures as described in Item 6 are used to test the exciter winding. Disconnect and remove the two red wires from the capacitor. Measure resistance across these red wires that lead into stator winding and test for grounded exciter winding.

Test also for continuity between red wires and all main power winding leads, having lead #1 - #2 and #3 - #4. If meter shows reading, the exciter winding has shorted (made connection) into the main power winding, and stator is defective. The red wires should not have any continuity with any of the four black wires, and they should not have continuity with a good ground surface.

Check all resistance values with the resistance chart found on Page 8. If complete stator winding is not the problem, proceed to the next repair step, #8.

STEP 8. Open, Shorted or Grounded Rotor Winding: The rotor assembly consists of two separate coils with two diodes mounted on a special heat-sink disc. For this test, it is necessary to remove the bearing bracket and stator so there is room to work on the rotor.

Prior to testing, visually inspect windings for dark streaks (shorted), check ball bearing by hand rotation. If it is rough, noisy or dry, replace bearing. Try a quick resistance test by placing ohmmeter test probes across the solder connection of each diode (rectifier) that is mounted on rotor. The resulting resistance must compare with rotor resistance as listed on chart as shown on Page 8. If resistance does not compare, further testing is required by removing the diodes from the rotor winding.

The two copper wires must be removed from the tip of the diodes where they are soldered. Remove these wires with the aid of a solder gun being careful not to break any copper wires. With copper wires free, check each coil with an ohmmeter on its lowest OHM x 1 scale. Record this value and compare it with the rotor resistance chart on Page 8.

Also test each coil to ground: One meter test lead to coil wire and the other test lead to the metal bracket that holds these coils. An ohmmeter reading indicates a grounded defective rotor, and it should be replaced. (See Figure 4)

Always inspect all stator and rotor windings for clean condition. Windings that are covered with mud, dirt, paint, and chemicals may test good; but they won't last long unless they are cleaned with an approved electrical cleaner then resealed with an air dry electrical varnish.

STEP 9. Diode (Rectifier): The exclusive and unique design of this "Power-Assist" brushless generator is the fail-proof diode system. It is highly unlikely that a diode should ever have to be replaced. This is why the diode testing is reserved for the last test. Diodes are the number one replacement problem with all other portable gen-set brands. Our 1600 volt, 25 amp diode capacity resists all spike problems, and it is a rare occurrence to have these special diodes fail. However, the repairman must be familiar with the function and repair of these diodes. Page 28 shows the diode position and connection.

A diode can “SHORT” or “OPEN” to become defective. A shorted diode is the most common defect in competitor’s generators, but not in this design, due to highly over-rated diode values. However, one or both diodes, as well as windings, can be destroyed if utility power is allowed to enter the gen-set. If gen-set is used for emergency power, with no isolating transfer switch, the return of utility power will enter the gen-set system.

If the engine no load speed is normal 3750 RPM but output voltage is only half the normal volts, one of the two diodes may be open, It is necessary to determine whether this voltage is a result of an open diode or is due to a defective rotor or stator winding. Suspect a defective capacitor if both diodes and windings are good.

Use an ohmmeter in the lowest scale OHMS x 1 position. Test the diode in the forward (positive) position. The ohmmeter should read approximately 15 OHMS (or close to zero). Reverse the ohmmeter test leads and read over 2000 ohms (or close to infinity). (See Figure 4.)

Simply put, regardless of meter polarity, the ohmmeter reading should be zero in one direction and infinity in the opposite direction (reversed meter test leads). The same infinity reading in both directions indicates an open diode. A zero reading in both directions indicates a shorted diode. Both examples indicate a defective diode and should be replaced. When one diode is defective, it is advised to replace both diodes as the remaining may have been weakened. Use a soldering iron to soften solder and remove the copper conductor wires from the diode. When re-soldering copper wires to new diode, be careful not to damage, crack, or break the copper wires. Do not allow heat of soldering iron to remain on diode for over ten seconds or diode damage may result.

NOTE: Depending on meter manufacturer, the red and black leads may be reversed in location as shown in Figure 4. If diodes test good, proceed to the next repair step, #10.

STEP 10. Actual component testing is now complete. Defect or problem should have been found during these repair steps #1 through #9. If problem exists, call service department toll-free (866) 537-4388 and ask for additional repair help.

Many other conditions may happen to cause no voltage output with no apparent reason:

A) If generator has been under water or left in a severe rain, the insulation system is soaked and will ground out if used. The generator must be taken apart and both stator and rotor must be oven baked at 300ºF for 3 hours.

B) If generator windings have been exposed to salt water (road salt or sea water), a condition between exciter and main winding will create a certain value of capacitance, nullifying standard capacitance. The windings must be cleaned and baked dry, as described in item (A).

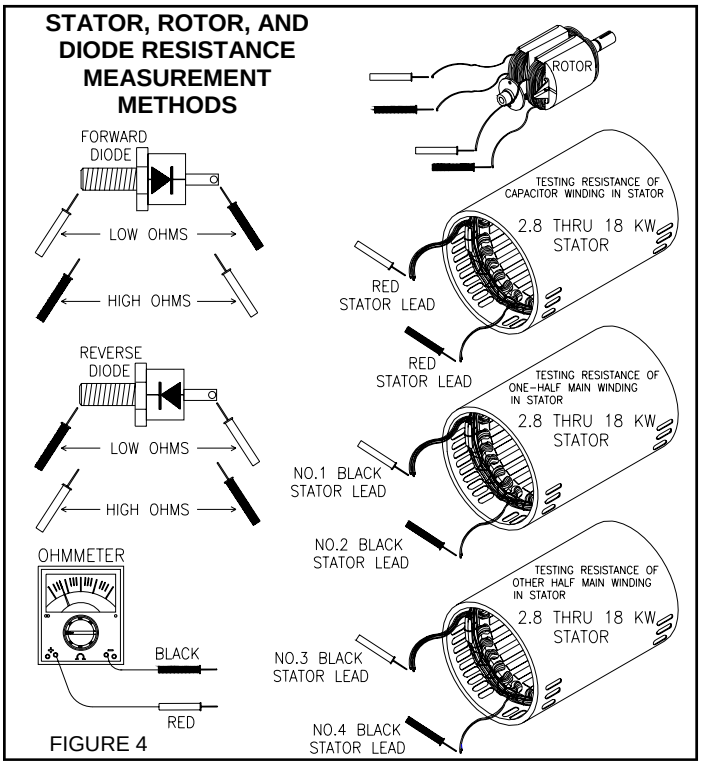


FIGURE 4

GENERATOR SIZE	MAIN WINDING		CAPACITOR WINDING		ROTOR WINDING	
AND KW RATING	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
2.8 AND 3.0 KW, 2 1/2 LAMINATION LENGTH	.905	.915	1.625	1.635	.850	.870
4.0 KW, 3" LAMINATION LENGTH	.568	.563	1.942	1.947	.905	.875
5.0 KW, 3 7/8" LAMINATION LENGTH	.365	.370	1.455	1.460	.710	.730
6.0 KW, 4 1/4 LAMINATION LENGTH	.343	.348	1.227	1.232	.735	.755
6.5 AND 7.5KW, 4 3/4 LAMINATION LENGTH	.247	.252	1.446	1.451	.832	.852
9.0 KW, 5 1/2" LAMINATION LENGTH	.169	.174	1.218	1.223	.515	.535
10.5 KW, 6" LAMINATION LENGTH	.130	.135	.563	.568	.555	.575
12.0 KW, 6 1/2" LAMINATION LENGTH	.119	.124	.562	.567	.587	.607
15.0 KW 7 3/4" LAMINATION LENGTH	.092	.097	.449	.454	.655	.675
18.0 KW 10" LAMINATION LENGTH	N/A	N/A	N/A	N/A	N/A	N/A

CAUTION: THESE RESISTANCE VALUES ARE VERY SMALL AND TESTING REQUIRES A GOOD QUALITY LOW RESISTANCE READING METER. ALL METER READINGS OF ZERO INDICATE AN OPEN(BAD) WINDING. ALL METER READINGS FROM WINDING TO METAL FRAME(GROUND), INDICATE A GROUNDED (BAD) WINDING. ROTOR RESISTANCE IS MEASURED ACROSS EACH SOLDER JOINT OF THE TWO DIODES, WHICH ARE CONNECTED IN PARRALLEL WITH ROTOR COILS. TO DETERMINE RESISTANCE OF EACH SINGLE POLE, MULTIPLY CHART RESISTANCE X 4, THEN ÷ BY 2.

QUICK REFERENCE GENERATOR FAULT GUIDE

SYMPTOM	POSSIBLE CAUSE	REMEDY
No Output Voltage, or a small, 16 to 24 VAC, as measured on two hot positions of 240 VAC receptacle	Generator rotor speed is too low.	Increase engine speed to 3750 RPM, 62 hertz, 125 volts, no load setting.
	Circuit breaker is tripped open.	Reset breaker, Check GFCI receptacles for proper operation
	Open, shorted capacitor or red leads disconnected from capacitor.	Replace capacitor or connected leads.
	Loss of rotor residual magnetism. (A reading of approximately 16 - 24 volts AC, indicates residual magnetism)	Restore magnetism by loading generator or flashing rotor fields.
	Defective receptacle panel.	Inspect all wiring and components on receptacle panel. Repair or replace
	One or both diodes open or shorted. (see figure 4)	Replace both diodes
	Open or shorted main power windings.	Replace stator.
	Open or shorted capacitor windings.	Replace stator.
	Open or shorted rotor winding.	Replace rotor.
Low Output Voltage	No load voltage between 8 - 12 volts at correct operating speed, on 120 VAC	One diode is open . capacitor is defective or exciter winding is bad.
	Engine speed slightly below operating speed but enough to collapse all output.	Increase engine speed to 3750 RPM, 62hertz, 125 volts, no load setting.
	Rotor winding wire broken off at diode solder joint.	Re-solder copper wire to diode.
	Rotor slipping and free wheeling on engine crankshaft.	(1) Tighten rotor thru-bolt. (2) Possible broken engine crankshaft.
	Rotor winding partially shorted.	Test rotor winding. Replace rotor.
High Output Voltage	Generator rotor speed too high.	Reduce engine speed to 3750 RPM, 62 hertz, 125 volts, no load setting.
	Higher micro-farad size capacitor is used.	Check capacitor size. It should be 50 mfd., 440 volts.
The No Load Voltage Output is at normal reading but drops down as electric load is applied.	Some generators have multiple copper wires in field coil. One or more of these individual wires may break off the connecting lead wire.	Test resistance measurements - replace stator.
	Rotor diodes have a partial loss of blocking characteristics but still tests good.	Replace diodes.
	Engine is in need of repair. Carboned cylinder head, bad fuel, or defective engine governor will reduce effective horse power.	Have authorized repair station test engine.
	The connected electric load has an unacceptable power factor, below .7 lagging inductive load.	Correct the power factor to be between .9 and 1.0.

If diode has shorted to conduction of both directions, the residual magnetism of rotor field may have been destroyed and it may be necessary to “flash” the exciter winding.

The generator set may be limited by the horsepower rating of the engine. As a guide, the engine has to supply (2) horsepower for each 1000 watts of power.

Rotation can be in either direction. There is no voltage output when engine speed drops 20% below normal 3750 rpm 62 hertz duty or 3150 rpm 52 hertz duty.

DIS-ASSEMBLY AND RE-ASSEMBLY INSTRUCTIONS FOR 2 -POLE GENERATOR KITS, 2.8KW - 18KW

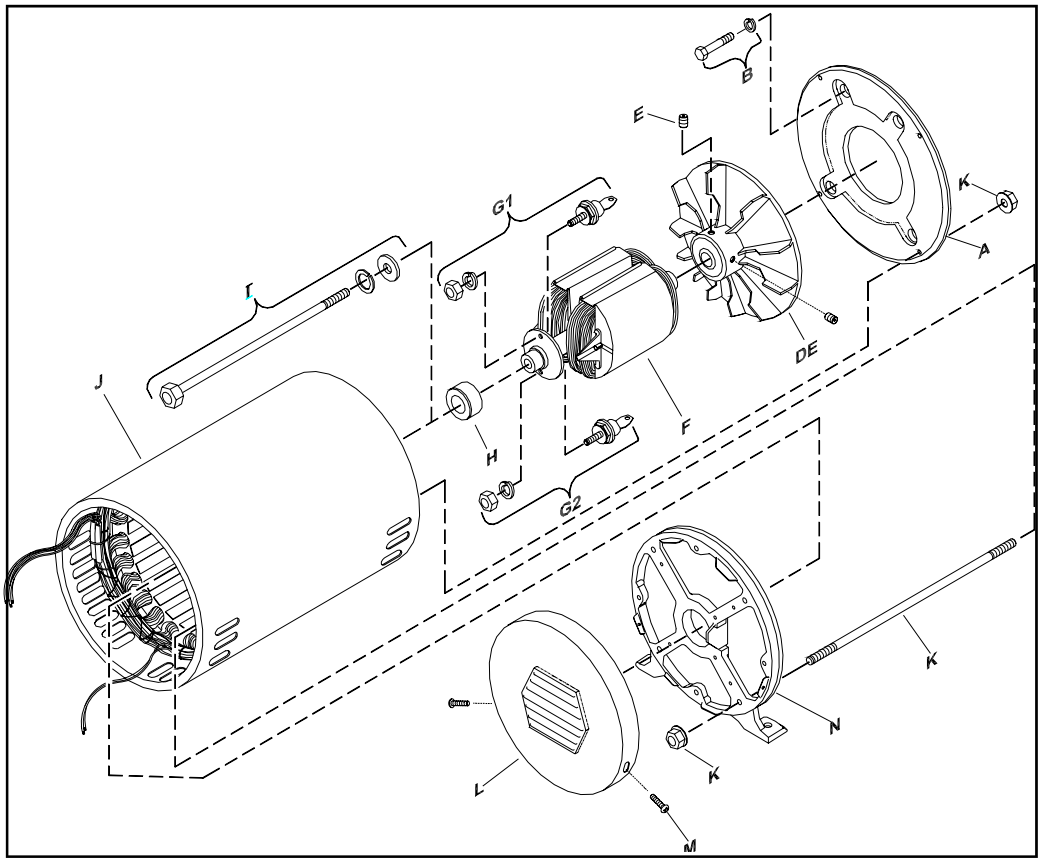
DIS-ASSEMBLY

STEP 1: Remove two machine screws from cover housing (Ref. L) and remove it from bearing casting (Ref. N).

STEP 2: Disconnect stator wires from flexible conduit wires by cutting apart the butt-splice insulated connectors. Be careful to make a drawing or mark all disconnected wires so that reconnections are correct.

STEP 3: Remove all four stator thru-bolts (Ref. K), both flange nuts on mounting feet of casting (Ref. N), and rotor thru-bolt (Ref. I).

STEP 4: Remove bearing bracket (Ref. N) from the generator. It will be necessary to lift the generator end up and off the vibration isolators to remove the casting. This bearing bracket casting is a tight fit on the stator flange and the rotor ball bearing so a pulley puller should be used. Do not pry this aluminum casting off with two screw-drivers as casting will become distorted and may crack or break. Be careful when casting is removed as remaining generator set will drop. It is recommended to block up the generator end to prevent it from falling.



STEP 5: Remove stator (Ref. J). It may be necessary to pry the stator assembly round housing from machine fit of engine casting (Ref. A). Once stator assembly is loose, pull stator over rotor assembly and free from generator. Be careful not to hit or scrape rotor or stator windings when stator is being removed.

STEP 6: The rotor shaft (Ref. F) has an inner female taper, and it has been fitted over the matching male taper of engine crankshaft. The rotor bolt (Ref. I) has already been removed in Step 3). The tight fit of these two taper fits will have to be loosened. Using a rawhide hammer or a steel hammer and wooden block, give the side of the rotor one or two sharp blows, then alternate to the other side with equal sharp blows. Eventually, the two tapers will loosen, and the rotor can be pulled free from the engine shaft. A last resort (for rust or corrosion between tapers) is to position rotor assembly straight up. The engine will be resting on its recoil starter. Pour penetrating oil straight down the hollow rotor shaft and let it set overnight. After 24 hours, proceed again to use sharp blows until rotor is free from engine shaft.

STEP 7: The cooling fan (Ref. D) is mounted on engine crankshaft on sizes 2 KW through 7.5 KW. The cooling fan is mounted on rotor shaft for sizes 9 KW to 15 KW. In all cases, loosen two fan hub set screws and pull fan free.

STEP 8: Remove four bolts from engine casting (Ref. A). Use soft hammer and tap casting off engine pilot flange.

RE-ASSEMBLY

This is basically a reversal of disassembly. The following is a brief recap with some emphasizing of important points.

STEP 1: Install engine casting on engine pilot flange and secure with four bolts. Casting must be even with pilot with no distorted or uneven assembly fit.

STEP 2: Re-install cooling fan on engine shaft or rotor shaft.

STEP 3: Install rotor onto engine taper; but first inspect female taper and engine shaft for clean surfaces. Push the rotor on the engine shaft and check for a snug fit. There should be no looseness or sloppy fit. Install rotor bolt (Ref. I) and tighten.

STEP 4: Slide stator over rotor and push into place as far as possible.

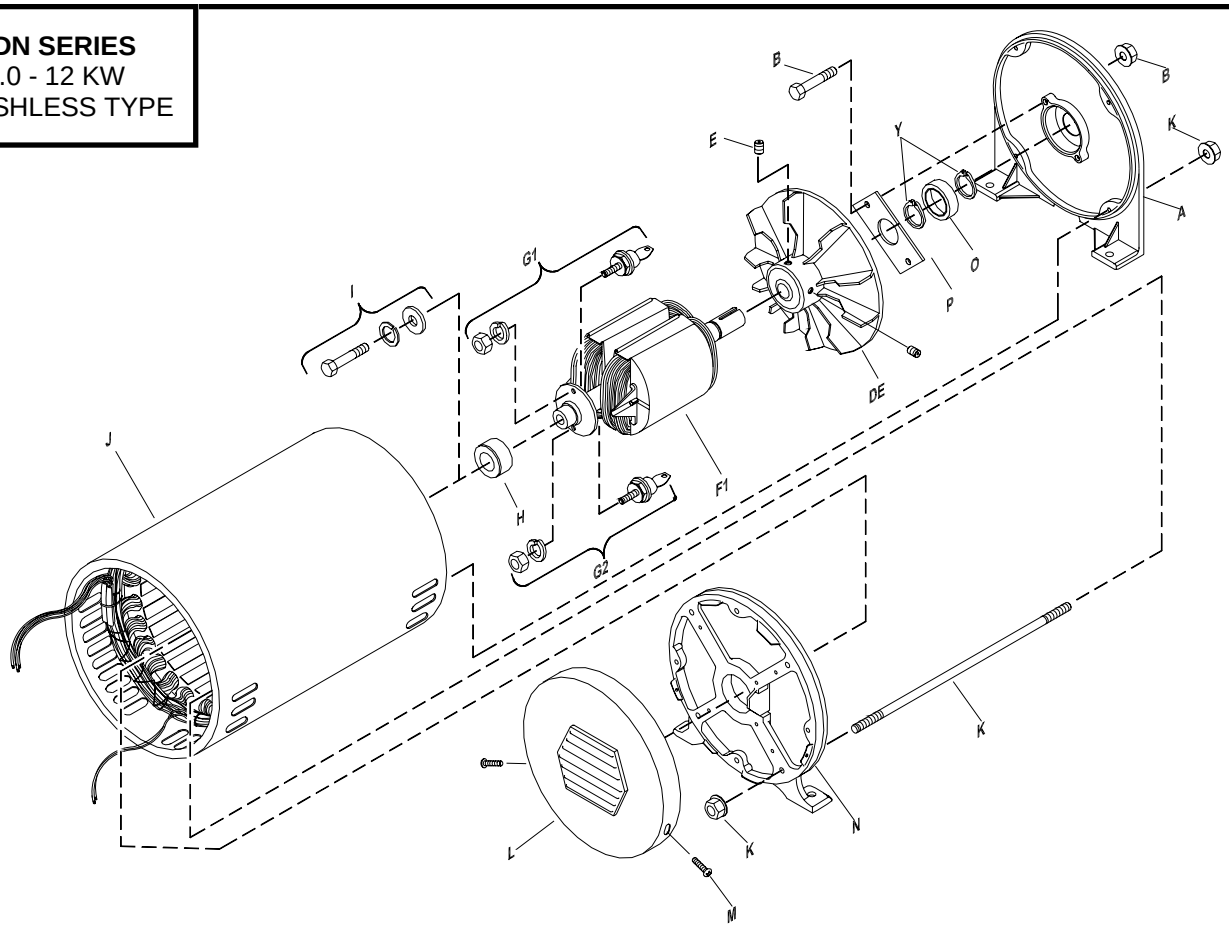
STEP 5: Install bearing casting (Ref. N) by lightly tapping its bearing bore over and onto the rotor ball bearing. Be very careful to start this casting on straight. Keep lightly tapping until casting is on the ball bearing but not fitting into inside diameter of stator sleeve ends. Install four stator thru-bolts (Ref. K) and matching flange nuts. Tighten nuts using X-pattern and lightly tap casting so it draws up evenly. Continue this until casting pilots are all the way into stator sleeve. Tap around casting bore to ensure pressure is relieved. Test by pulling on engine starting rope. The generator must turn easily or assembly is wrong.

STEP 6: Finish reconnection of wires and assemble cover (Ref. L).

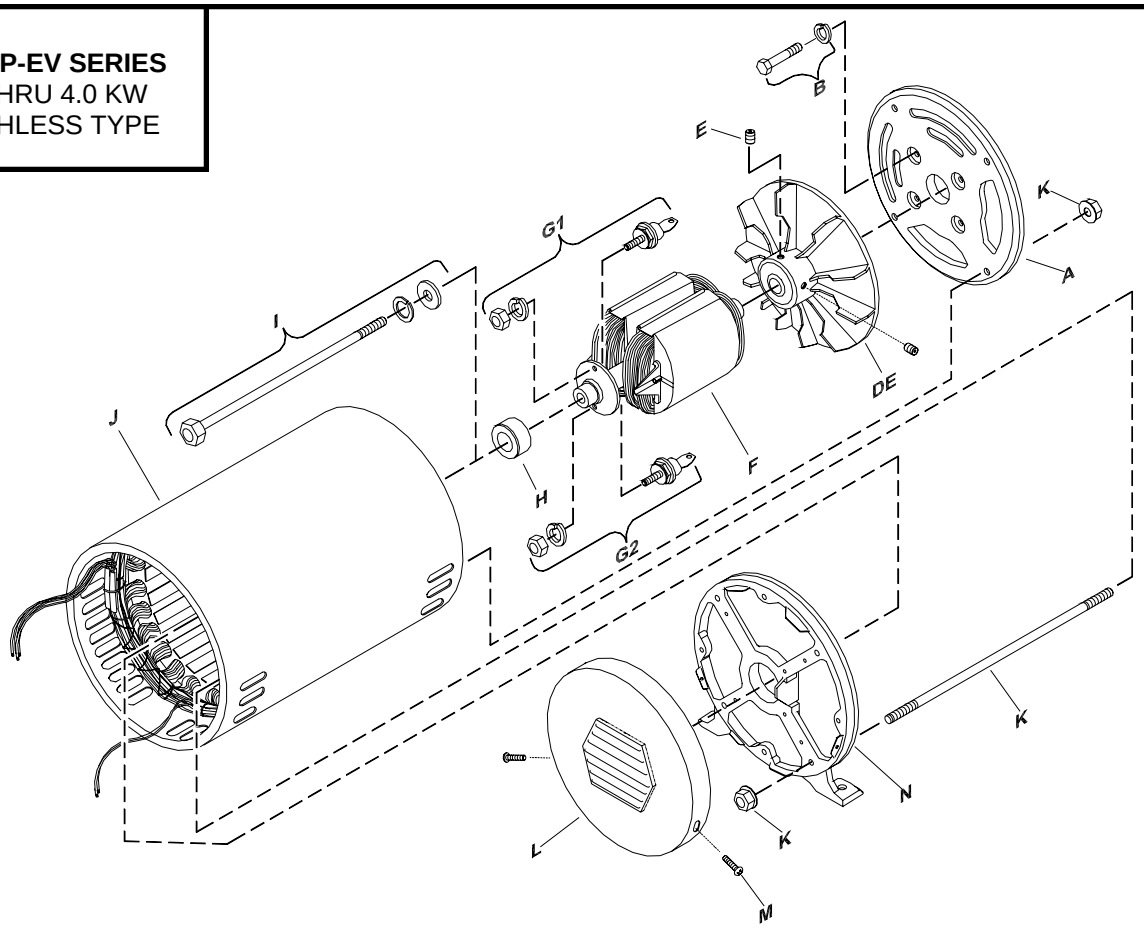
BRUSHLESS AND BRUSH TYPE GENERATOR REPAIR PARTS AND LIST PRICE SHEET				MAXIMUM (STANDBY) KW SIZE							
GPN-GPND-GPNR-PP-EV-BDN2-K2N			LIST PRICE EACH ITEM	2200 3000	3500 4000	4500 5000 5500 6000	6500 7500	9000	10500	12500	14000 15000
REF.	PART#	REPAIR PART DESCRIPTION									
A	220007	DRIVE END CASTING, BDN	$ 112	1		1					
A	220008	DRIVE END CASTING, BDN	123				1	1		1	
A	220001	ENGINE CASTING	77	1	1						
A	220002	ENGINE CASTING	77			1	1				
A	220010	ENGINE CASTING, 5 3/4" PILOT	105					1	1	1	1
A	220011	ENGINE CASTING, 6 7/16" PILOT	125					1	1	1	1
A	220012	ENGINE CASTING, 7" PILOT	125					1	1	1	1
B	201001	BOLT AND NUT, BDN BEARING RETAINER	2	2		2	2	2		2	
B	201002	5/16" BOLT AND WASHER, CASTING RETAINER	2	4	4						
B	201003	3/8" BOLT AND WASHER, CASTING RETAINER	2			4	4				
B	201004	7/16" BOLT AND WASHER, CASTING RETAINER	3					4	4	4	4
DE	230017	COOLING FAN WITH SCREWS (E) A - FAN	41	1	1						
DE	430017	COOLING FAN WITH SCREWS (E) BORED -A (PP-28)	41	1							
DE	230018	COOLING FAN WITH SCREWS (E) C - FAN	41			1	1				
DE	230019	COOLING FAN WITH SCREWS (E) D - FAN	41			1	1				
DE	230020	COOLING FAN WITH SCREWS (E) E - FAN (BDN)	41	1		1					
DE	230022	COOLING FAN WITH SCREWS (E) G - FAN (BDN)	46				1	1		1	
DE	230022	COOLING FAN WITH SCREWS (E) G - FAN	46					1	1	1	1
FGH	612500	ROTOR, 2.2, 3.0 KW (2 1/2" LAM STACK)	350	1							
FGH	613000	ROTOR, 3.5, 4.0 KW (3" LAM STACK)	373		1						
FGH	613870	ROTOR, 4.5, 5.0, 5.5, 6.0 KW (3 7/8" LAM STACK)	406			1					
FGH	614250	ROTOR, 6 KW (4 1/4" LAM STACK)	425			1					
FGH	614750	ROTOR, 6.5, 7.5 KW (4 3/4" LAM STACK)	484				1				
FH3	634750	ROTOR, 8.0, 9.0 KVA 3Ø (4 3/4" LAM STACK)	550				1				
FGH	615500	ROTOR, 9.0 KW (5 1/2" LAM STACK)	556					1			
FH3	635500	ROTOR, 11.0 KVA 3Ø (5 1/2" LAM STACK)	662					1			
FGH	616000	ROTOR, 10.5 KW (6" LAM STACK)	608						1		
FH3	636000	ROTOR, 13.0 KVA 3Ø (6" LAM STACK)	675						1		
FGH	616500	ROTOR, 12.5 KW (6 1/2" LAM STACK)	640							1	
FH3	636500	ROTOR, 15.0 KVA 3Ø (6 1/2" LAM STACK)	707							1	
FGH	617750	ROTOR, 14 KW (7 3/4" LAM STACK)	700								1
FH3	637750	ROTOR, 17.5 KVA 3Ø (7 3/4" LAM STACK)	806								1
FGH	261250	ROTOR, 3.0 KW (BDN) (2 1/2" LAM STACK)	350	1							
FGH	261387	ROTOR, 4.5 KW (BDN) (3 7/8" LAM STACK)	393		1						
FGH	261425	ROTOR, 6.0 KW (BDN) (4 1/4" LAM STACK)	465			1					
FGH	261475	ROTOR, 7.5 KW (BDN) (4 3/4" LAM STACK)	510				1				
FH3	263475	ROTOR, 9.0 KVA (BDN-3Ø) (4 3/4" LAM STACK)	577				1				
FGH	261550	ROTOR, 9.0 KW (BDN) (5 1/2" LAM STACK)	622					1			
FH3	263550	ROTOR, 11.0 KVA (BDN-3Ø) (5 1/2" LAM STACK)	727					1			
FGH	261650	ROTOR, 12.0 KW (BDN) (6 1/2" LAM STACK)	667								1
G1	270801	RECTIFIER, REVERSE POLARITY w/ HDWR	34	1	1	1	1	1	1	1	1
G2	270802	RECTIFIER, FORWARD POLARITY w/ HDWR	34	1	1	1	1	1	1	1	1
H	241000	BALL BEARING, SINGLE ROW	12	1	1	1	1	1	1	1	
H	241001	BALL BEARING, DOUBLE ROW	35								1
H	241001	BALL BEARING, DOUBLE ROW FOR BDN	35	1		1	1	1		1	
I	210218	ROTOR THRU-BOLT ASSEMBLY, 7 3/8" LG.	8	1	1	1					
I	210225	ROTOR THRU-BOLT ASSEMBLY, 12" LG. (MODEL GPND-125E)	8							1	
I	210206	ROTOR THRU-BOLT ASSEMBLY, 8 5/8" LG.	8				1				
I	210207	ROTOR THRU-BOLT ASSEMBLY, 11 1/2" LG	8					1	1	1	
I	210208	ROTOR THRU-BOLT ASSEMBLY, 14 3/8" LG	8								1
I	206006	ROTOR END, BEARING RETAINER BOLT, ASSMBLY 3/4"LG	5	1		1		1		1	
J	712250	STATOR, 2.2, 3.0 KW (2 1/2" LAM	323	1							
J5	712255	STATOR, 1.8 - 2.3 KW (50 HZ) (2 1/2" LAM	334	1							
J	713000	STATOR, 3.5, 4.0 KW (3" LAM	340		1						
J5	713005	STATOR, 2.8, 3.2 KW (50 HZ) (3" LAM	354		1						
J	713870	STATOR, 4.5, 5.0, 5.5, KW (3 7/8" LAM	393			1					
J5	713875	STATOR, 3.5, 4.0, 4.5, KW (50 HZ) (3 7/8" LAM	406			1					
J	714250	STATOR, 6.0 KW (4 1/4" LAM	458			1					
J5	714255	STATOR, 5.0 KW (50 HZ) (4 1/4" LAM	472			1					
J	714750	STATOR, 6.5, 7.5 KW (4 3/4" LAM	517				1				
J5	714755	STATOR, 5.5, 6.0 KW (50 HZ) (4 3/4" LAM	530				1				
J3	734750	STATOR, 8.0, 9.0 KVA 3Ø (4 3/4" LAM STACK)	556				1				
J35	734755	STATOR, 6.5, 7.5 KVA 3Ø (50 HZ) (4 3/4" LAM STACK)	569				1				
J	715500	STATOR, 9.0 KW (5 1/2" LAM STACK)	569					1			
J5	715505	STATOR, 7.5 KW (50 HZ) (5 1/2" LAM STACK)	583					1			
J3	735500	STATOR, 11.0 KVA, 3Ø (5 1/2" LAM STACK)	608					1			
J35	735505	STATOR, 9.0 KVA, 3Ø (50 HZ) (5 1/2" LAM STACK)	622					1			
J	716000	STATOR, 10.5 KW (6" LAM STACK)	603						1		
J5	716005	STATOR, 8.0 KW (50 HZ) (6" LAM STACK)	616						1		

BRUSHLESS AND BRUSH TYPE GENERATOR REPAIR PARTS AND LIST PRICE SHEET				MAXIMUM (STANDBY) KW SIZE							
GPN-GPND-GPNR-PP-EV-BDN2-K2N			LIST PRICE EACH ITEM	2200 3000	4000	4500 5000 5500 6000	6500 7500	9000	10500	12500	14000 15000
REF.	PART #	REPAIR PART DESCRIPTION									
J3	736000	STATOR, 13.0 KVA, 3Ø	(6" LAM STACK)	642					1		
J35	736005	STATOR, 10.0 KVA, 3Ø (50 HZ)	(6" LAM STACK)	655					1		
J	716500	STATOR, 12.0 KW	(6 1/2" LAM STACK)	635						1	
J5	716505	STATOR, 9.0 KW (50 HZ)	(6 1/2" LAM STACK)	648						1	
J3	736500	STATOR, 15.0 KVA, 3Ø	(6 1/2" LAM STACK)	674						1	
J35	736505	STATOR, 12.0 KVA, 3Ø (50HZ)	(6 1/2" LAM STACK)	687						1	
J	717750	STATOR, 14 KW	(7 3/4" LAM STACK)	700							1
J5	717755	STATOR, 12 KW (50 HZ)	(7 3/4" LAM STACK)	714							1
J3	737750	STATOR, 18.8 KVA, 3Ø	(7 3/4" LAM STACK)	739							1
J35	737755	STATOR, 15.0 KVA, 3Ø (50 HZ)	(7 3/4" LAM STACK)	753							1
K	210211	STATOR THRU-BOLT WITH NUTS, 9 3/4" LG.		5	4	4					
K	210209	STATOR THRU-BOLT WITH NUTS, 11" LG.		5			4				
K	210212	STATOR THRU-BOLT WITH NUTS, 12 1/2" LG.		5				4			
K	210213	STATOR THRU-BOLT WITH NUTS, 14 3/4" LG.		7					4	4	4	
K	210214	STATOR THRU-BOLT WITH NUTS, 17 3/4" LG.		10							4
LM	211040	INSPECTION COVER WITH SCREWS		24	1	1	1	1	1	1	1	1
N	220005	BEARING CASTING, 1 PHASE		100	1	1	1	1	1	1	1	1
N	420005	BEARING CASTING, 3 PHASE		106				1	1	1	1	1
O	241002	BALL BEARING, BDN DRIVE END		65	1		1					
O	241003	BALL BEARING, BDN DRIVE END		88				1	1		1	
P	210739	BEARING RETAINER PLATE, BDN		7	1		1					
P	210740	BEARING RETAINER PLATE, BDN		8					1		1	
Q	240800	BRUSHES WITH SCREWS, 3Ø		10				2	2	2	2	2
R	201007	SCREW AND LOCKWASHER, 3Ø		1				1	1	1	1	1
SS	230023	BRUSH-BRUSH HOLDER ASSEMBLY, 3Ø		60				1	1	1	1	1
Y	240101	RETAINER RING, BALL BEARING		7	2		2					
Y	240102	RETAINER RING, BALL BEARING		7				2	2		2	

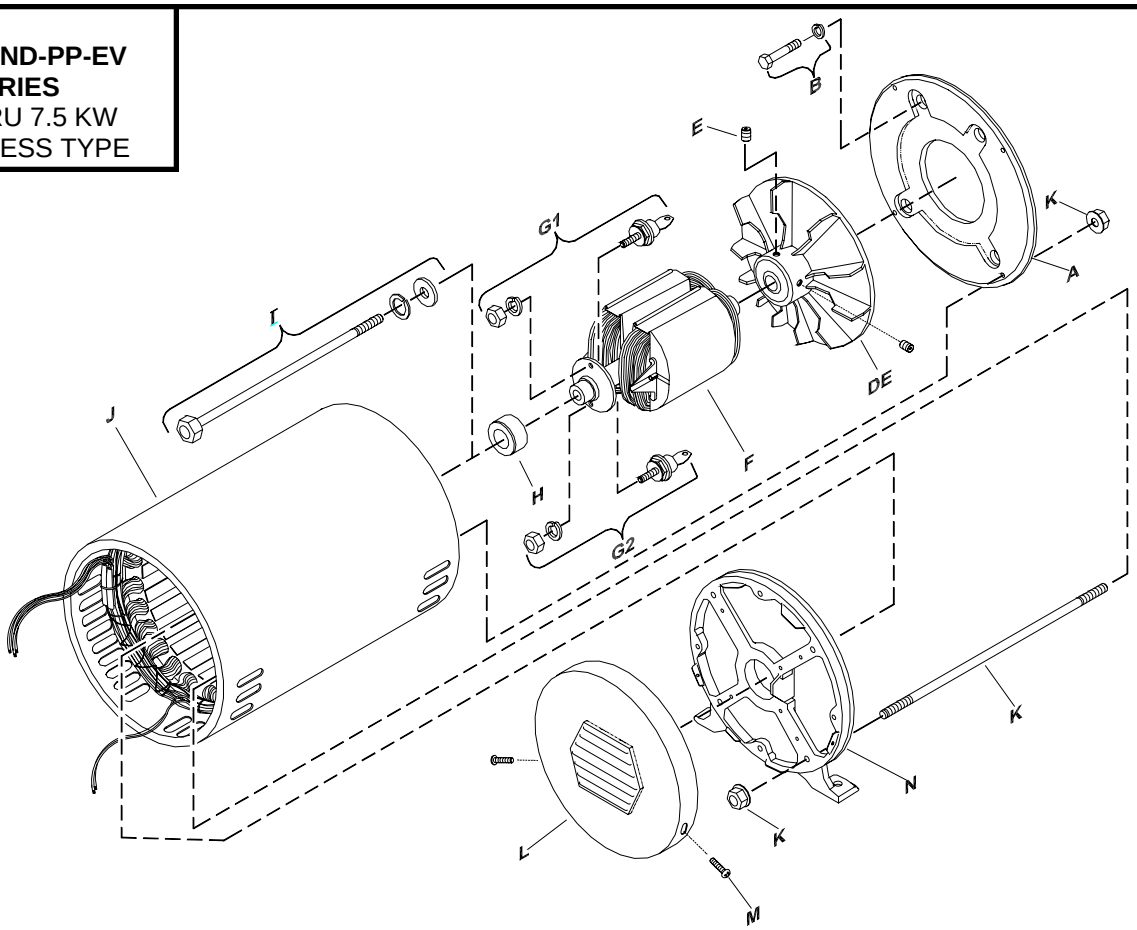
BDN SERIES
3.0 - 12 KW
BRUSHLESS TYPE



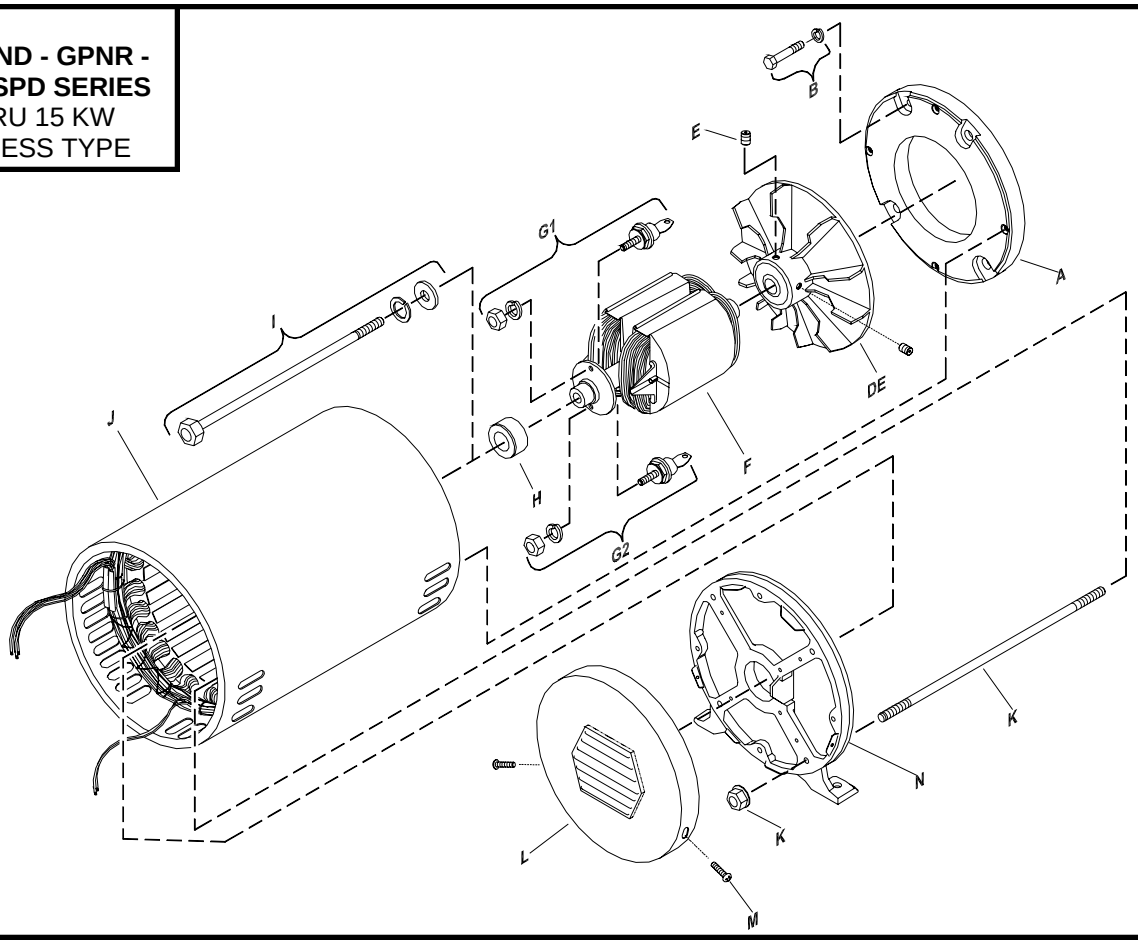
GPN-PP-EV SERIES
2.2 THRU 4.0 KW
BRUSHLESS TYPE



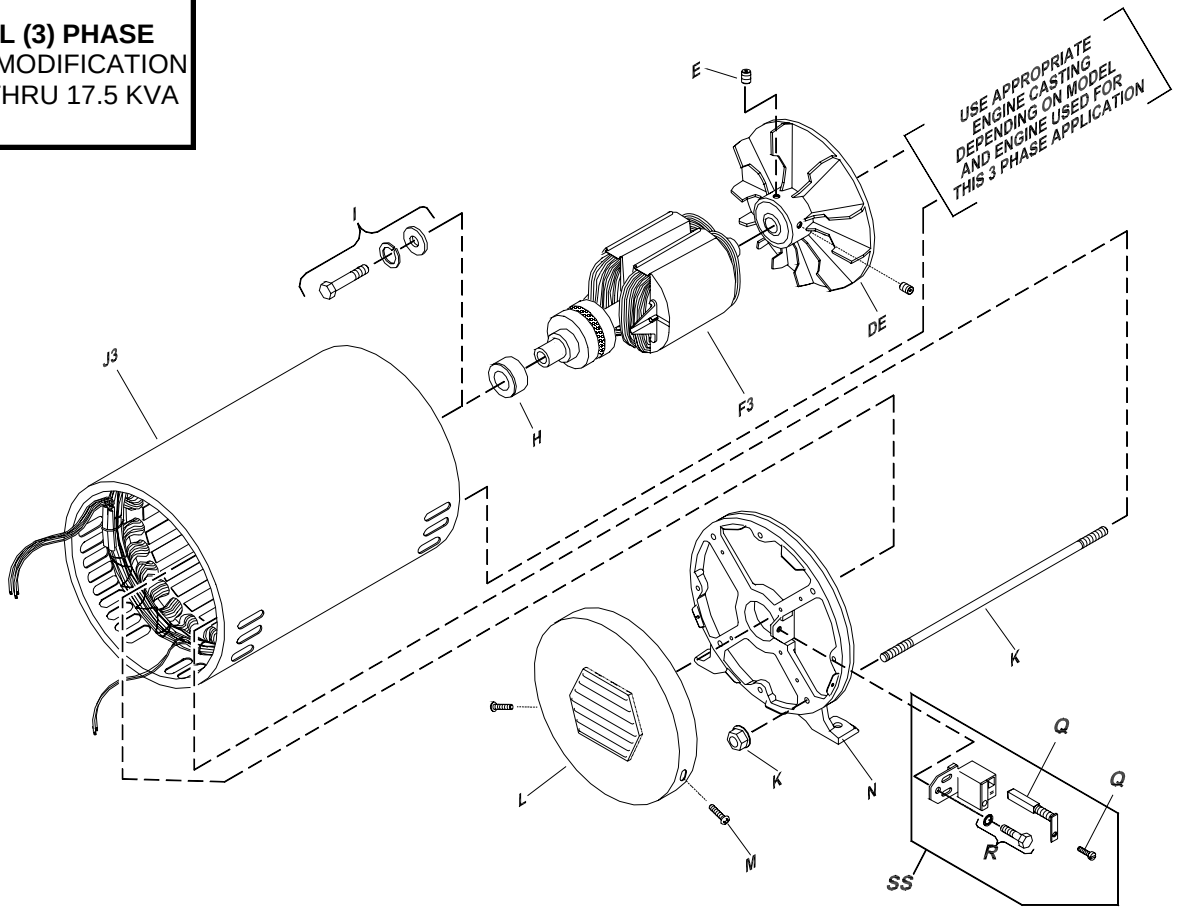
GPN-GPND-PP-EV SERIES
4.5 THRU 7.5 KW
BRUSHLESS TYPE



GPN - GPND - GPNR -
EV - SP - SPD SERIES
9.0 THRU 15 KW
BRUSHLESS TYPE

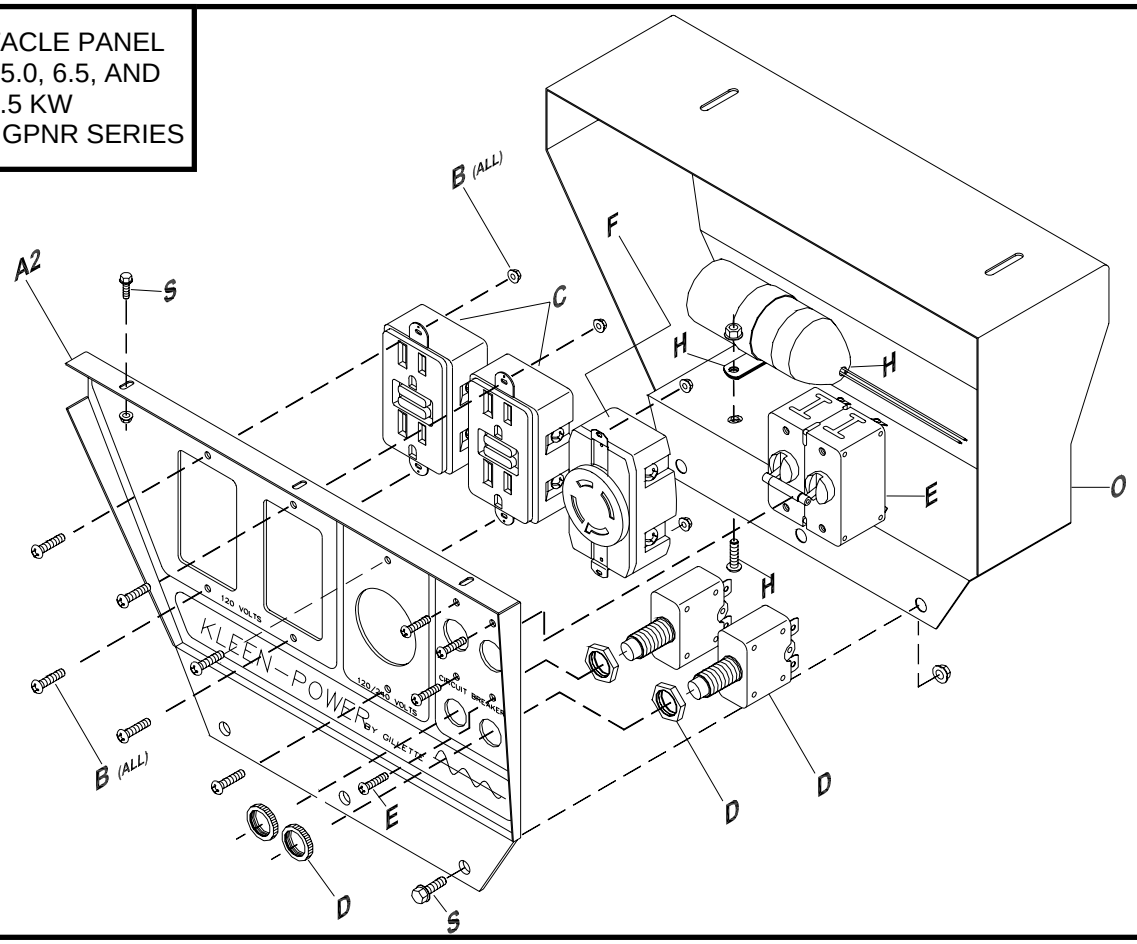


TYPICAL (3) PHASE
WINDING MODIFICATION
FROM 6 THRU 17.5 KVA



RECEPTACLE PANEL / ENGINE COVER REPAIR PARTS AND LIST PRICE SHEET				MAXIMUM (STANDBY) KW SIZE AIR COOLED ENGINES							
GPN-GPND-GPNR-PP-EV-BDN2-K2N			LIST PRICE EACH ITEM	2200 3000	3500 4000	4500 5000 5500 6000	6500 7500	9000	10500	12500	14000 15000
REF.	PART #	REPAIR PART DESCRIPTION									
A	211042	RECEPT. PANEL COVER ONLY (PP)	27	1							
AA	911042	RECEPT. PANEL - COMPLETE - BUILD (PP)	66	1							
A1	211024	RECEPT. PANEL COVER ONLY (PP)	47		1	1	1				
AA1	911024	RECEPT PANEL - COMPLETE - BUILD (PP)	134		1	1	1				
A2	211028	RECEPT. PANEL COVER ONLY (GPN)	45		1	1	1				
AA2	911028	RECEPT PANEL - COMPLETE - BUILD (GPN)	200		1	1	1				
A3	211038	RECEPT. PANEL COVER ONLY (GPNDL-60E) (GPN)	69			1		1	1	1	1
AA3	911038	RECEPT PANEL - COMPLETE - BUILD (GPNDL-60E) (GPN)	323			1		1	1	1	1
A4	211029	RECEPT. PANEL AND BOX ONLY (BDN)	40	1							
AA4	911029	RECEPT. PANEL AND BOX COMPLETE - BUILD (BDN)	197	1							
A5	211030	RECEPT. PANEL AND BOX ONLY (BDN)	58			1					
AA5	911030	RECEPT. PANEL AND BOX COMPLETE - BUILD (BDN)	200			1					
A6	211030	RECEPT. PANEL COVER ONLY (EV)	67			1					
AA6	911030	RECEPT. PANEL - COMPLETE - BUILD (EV)	236			1					
A7	211031	RECEPT. PANEL AND BOX ONLY (BDN)	64				1				
AA7	911031	RECEPT. PANEL AND BOX COMPLETE - BUILD (BDN)	257				1				
A8	411031	RECEPT. PANEL AND BOX ONLY (BDN)	66					1		1	
AA8	411931	RECEPT. PANEL AND BOX COMPLETE - BUILD (BDN)	273					1		1	
A9	211023	BLANK PANEL COVER ONLY (3Ø)	36				1				
A10	211003	BLANK PANEL COVER ONLY (3Ø)	54					1	1	1	1
AA10	911003	BLANK PANEL - COMPLETE (3Ø)	182					1	1	1	1
A11	930979	ENGINE COVER W/ METERS 3 - 5.5 KW (GPN)	235		1	1					
A12	930983	ENGINE COVER W/ METERS 6.5 - 7.5 KW (GPN)	249				1				
A13	910979	ENGINE COVER 3 - 5.5 KW (PP)	54		1	1					
A14	910983	ENGINE COVER 6.5 - 7.5 KW (PP)	65				1				
A15	910955	ENGINE COVER 9 - 15 KW (GPN)	145					1	1	1	1
B	201008	PANEL AND COMPONENT HDWR	3	4	6	6	6	8	8	8	8
C	270300	DUPLEX RECEPT., NEMA 5-15R (PP - BDN)	10	2	2	2	2	2		2	
C	270313	DUPLEX RECEPT., NEMA 5-15R, GFCI (GPN - GPNR)	38		2	2	2	2	2	2	2
D	270701	CIRCUIT BREAKER, 20 A., PUSH BUTTON	57	1	2	2					
D	270702	CIRCUIT BREAKER, 25 A., PUSH BUTTON	57				2	2	2	2	2
D	270703	CIRCUIT BREAKER, 30 A., PUSH BUTTON (GPN)	71				1	1	1	1	1
D1	270703	CIRCUIT BREAKER, 30 A., PUSH BUTTON (BDN)	71				2				
D1	270707	CIRCUIT BREAKER, 35 A., PUSH BUTTON (BDN)	71					2			
D1	270704	CIRCUIT BREAKER, 40 A., PUSH BUTTON (BDN)	71						2		
D1	270706	CIRCUIT BREAKER, 50 A., PUSH BUTTON (BDN)	80							2	
E	270715	CIRCUIT BREAKER, 20 A., 1 POLE MAG. (GPN)	36	1							
E	270716	CIRCUIT BREAKER, 20 A., 2 POLE MAG. (GPN - GPNR)	65		1	1					
E	270717	CIRCUIT BREAKER, 30 A., 2 POLE MAG. (GPN - GPNR)	71				1				
E	270718	CIRCUIT BREAKER, 35 A., 2 POLE MAG. (GPN - GPNR)	78					1			
E	270719	CIRCUIT BREAKER, 45 A., 2 POLE MAG. (GPN - GPNR)	83						1	1	
E	270720	CIRCUIT BREAKER, 50 A., 2 POLE MAG. (GPN - GPNR)	90								1
F	270311	RECEPT. TWIST-LOCK NEMA L14-20R	50			1					
F	270310	RECEPT. TWIST-LOCK NEMA L14-30R	57				1				
F	270314	RECEPT. STRAIGHT BLADE NEMA 14-30R	59			1					
F	270308	RECEPT. STRAIGHT BLADE NEMA 14-50R	62					1	1	1	1
G	270306	RECEPT. TWIST-LOCK NEMA L5-30R	53			1		1	1	1	1
H	270863	440V CAPACITOR, BRACKET, AND HDWR 3 - 9 KW	84	1	1	1	1	1			
HH	270863-2	440V DUAL CAPACITORS, BRACKET, AND HDWR 10.5 - 15 KW	168						1	1	1
I	270806	VOLTMETER AND HDWR (GPN)	59		1	1	1	1	1	1	1
J	270807	HOUR METER AND HDWR (GPN)	50		1	1	1	1	1	1	1
K	270011	ROCKER START-STOP SWITCH (OPTIONAL) (GPNR)	10			1	1	1	1	1	1
L	241109	KUBOTA START-STOP KEY SWITCH (GPND)	75				1			1	1
L1	241110	KUBOTA PRE-HEAT INDICATOR LIGHT (GPND)	20				1			1	1
M	230300	BLANK PLUG, ROCKER SWITCH (OPTIONAL) (GPN)	3			1	1	1	1	1	1
N	230304	BLANK PLUG, CIRCUIT BREAKER (3Ø)	2		2		5	5	5	5	5
O	211046	RECEPTACLE PANEL BOX (PP - GPN)	53		1	1	1				
O	211010	RECEPTACLE PANEL BOX (GPN)	53			1		1	1	1	1
O	211031	RECEPTACLE PANEL BOX (EV)	53			1	1				
P	270803	VOLTAGE REGULATOR BOARD AND HDWR (3Ø)	476				1	1	1	1	1
Q	270910	FUSE HOLDER (3Ø)	10				1	1	1	1	1
Q1	270902	FUSE, 10 A. GLASS CARTRIDGE (3Ø)	4				2	2	2	2	2
R	270515	LOAD TERMINAL STRIP (3Ø)	30				1	1	1	1	1
S	260025	RECEPT. PANEL / BOX HDWR	3	2							
S	260000	RECEPT. PANEL / BOX HDWR	3		6	6	6				
S	260027	RECPET. PANEL / BOX HDWR	3					4	4	4	4
U	210989	UPPER MOUNTING BRACKET (GPN)	32			1	1	1	1	1	1

RECEPTACLE PANEL
3.0, 4.0, 5.0, 6.5, AND
7.5 KW
GPN AND GPNR SERIES



RECEPTACLE PANEL
4.0, 5.0, 6.0, 7.5, 9.0,
10.5, 12.5, 15.0 KW
GPN, GPND,
GPNR SERIES

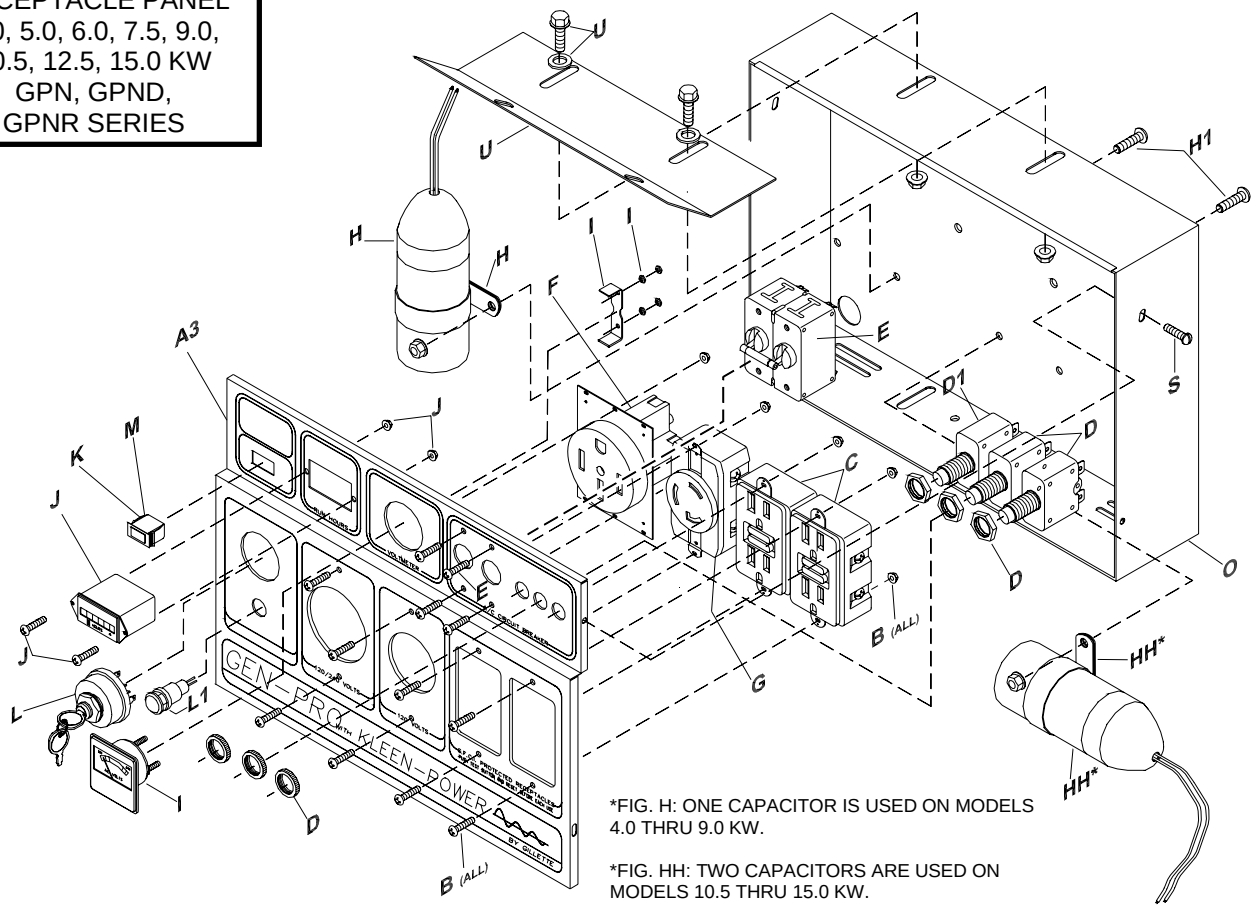
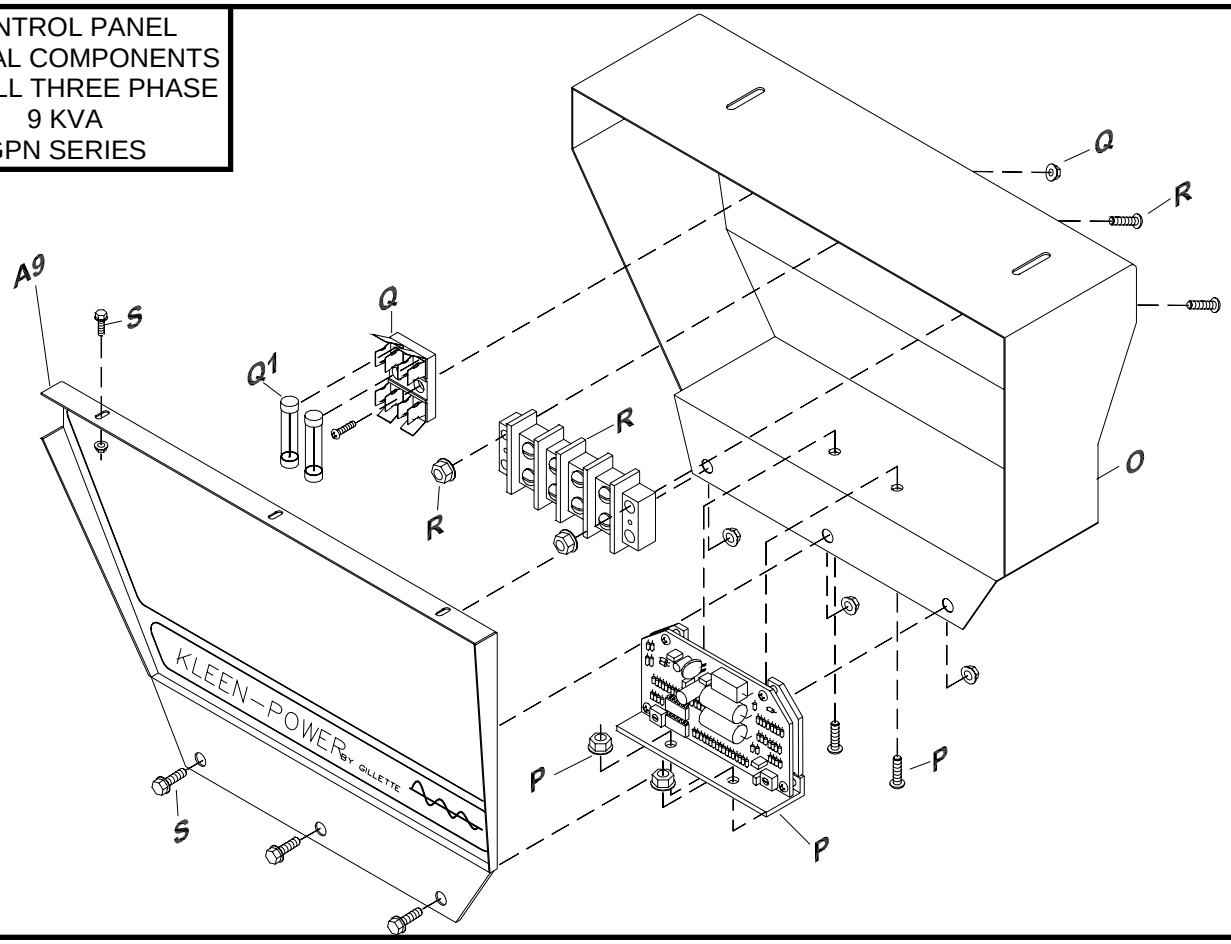


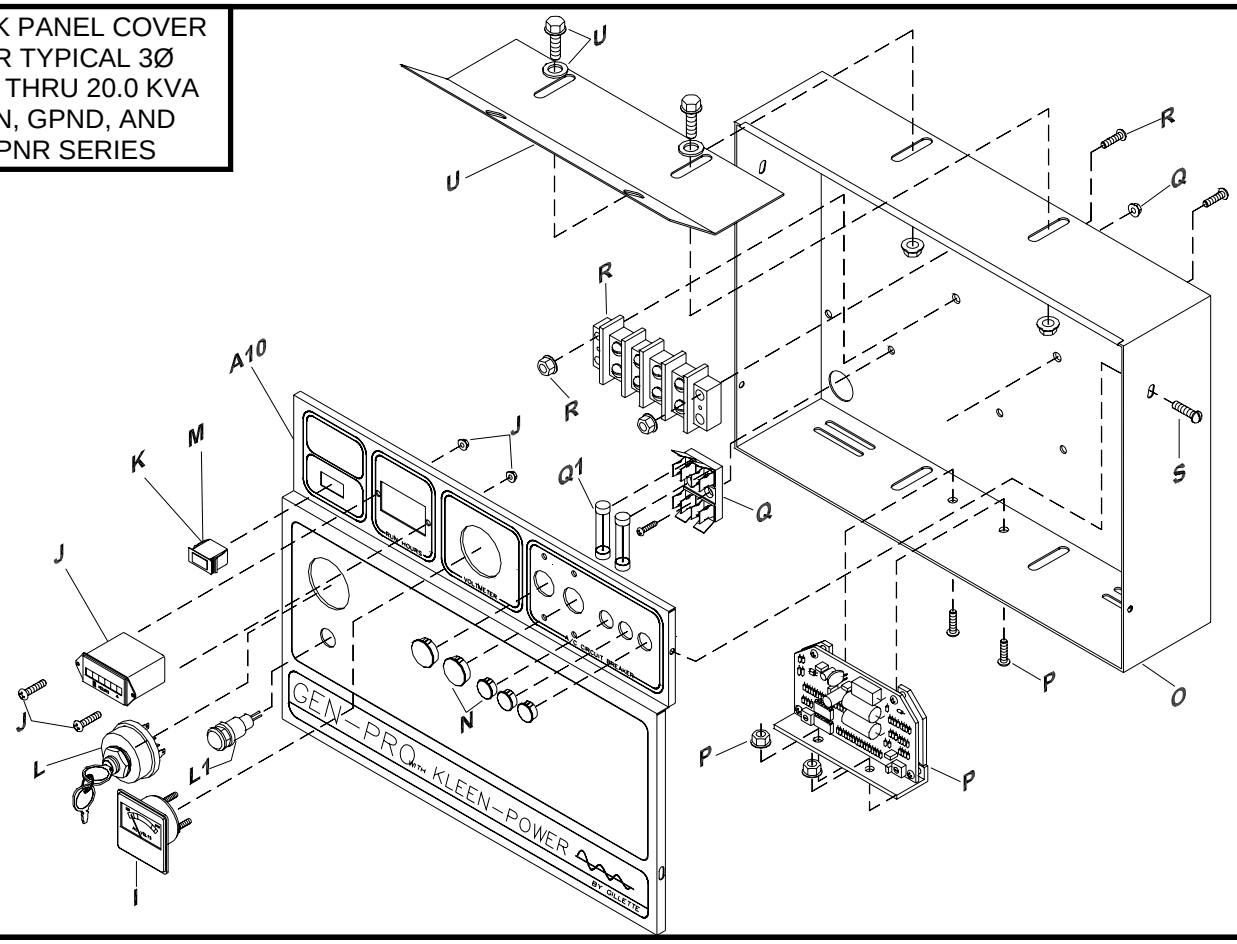
*FIG. H: ONE CAPACITOR IS USED ON MODELS 4.0 THRU 9.0 KW.

*FIG. HH: TWO CAPACITORS ARE USED ON MODELS 10.5 THRU 15.0 KW.

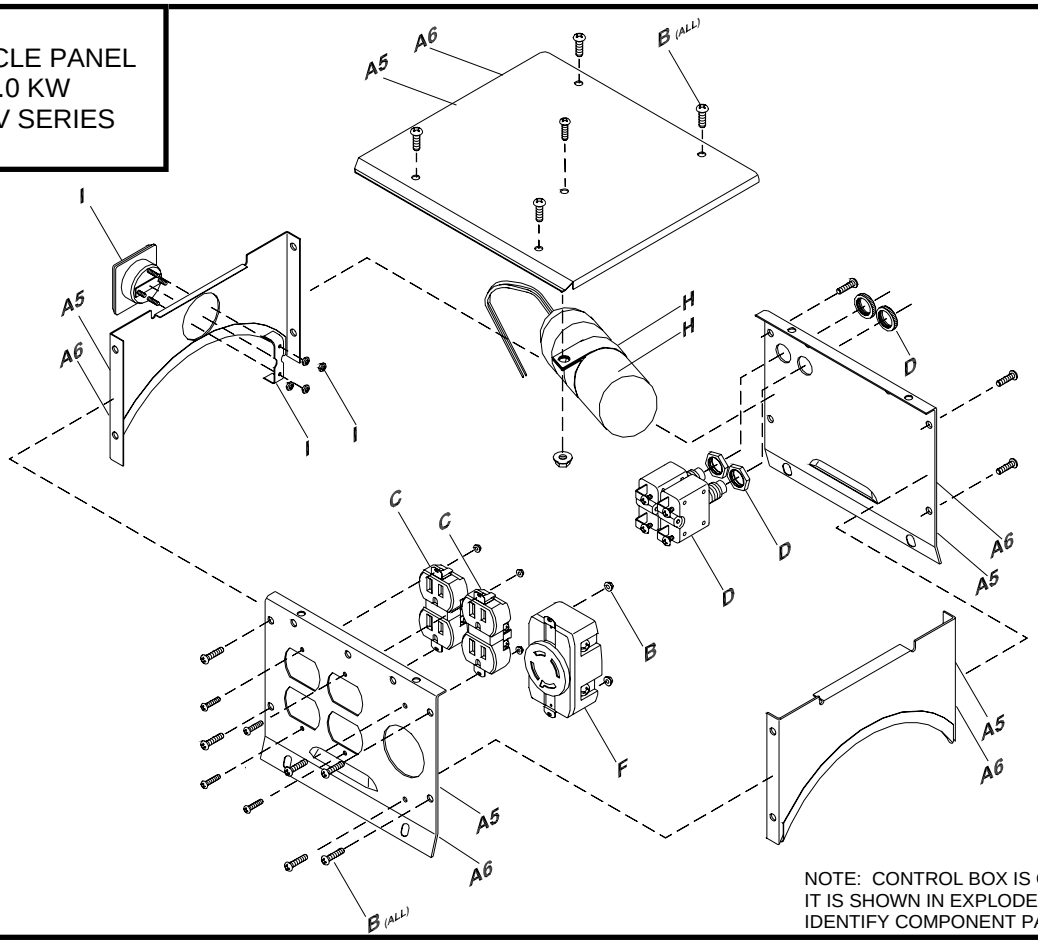
CONTROL PANEL
TYPICAL COMPONENTS
FOR ALL THREE PHASE
9 KVA
GPN SERIES



BLANK PANEL COVER
FOR TYPICAL 3Ø
11.25 THRU 20.0 KVA
GPN, GPND, AND
GPNR SERIES



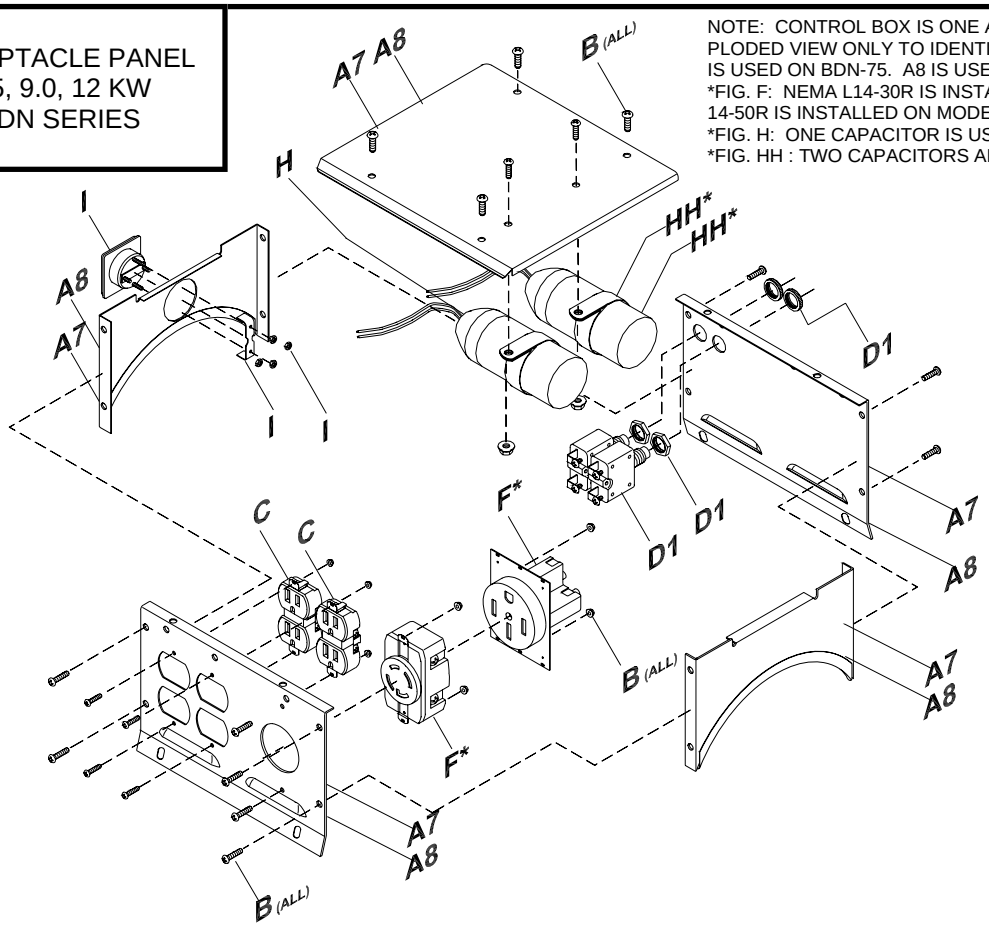
RECEPTACLE PANEL
4.5, 6.0 KW
BDN & EV SERIES



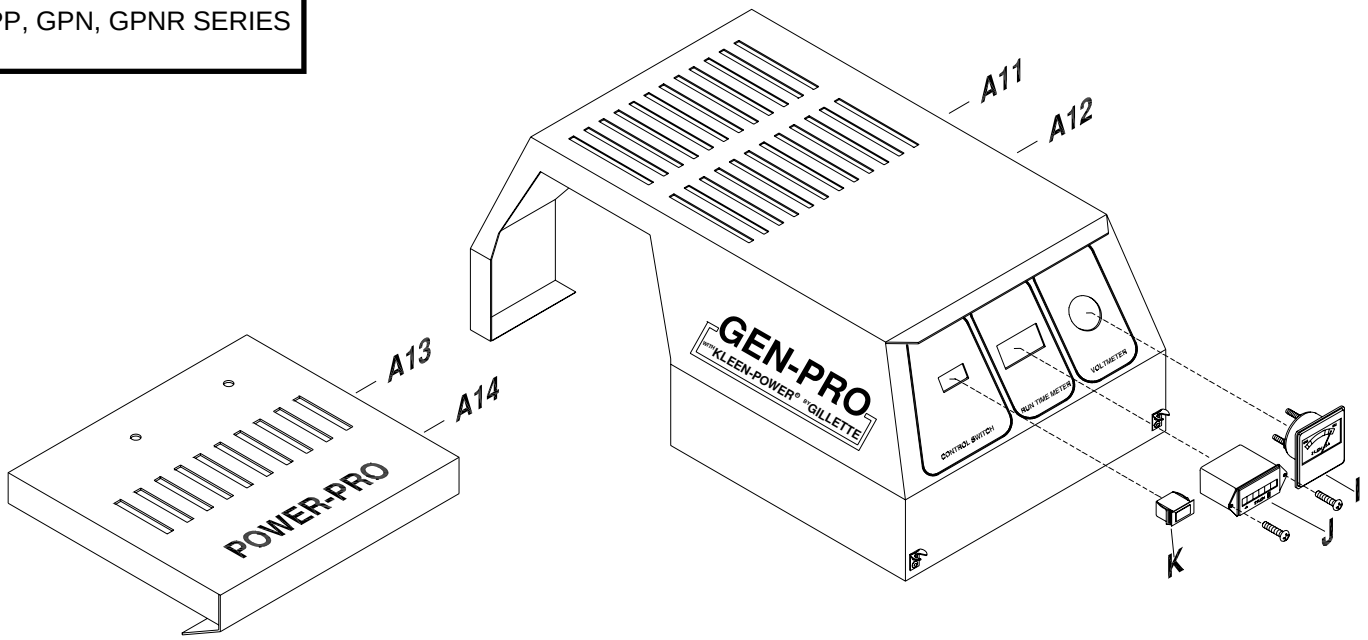
NOTE: CONTROL BOX IS ONE ASSEMBLY.
IT IS SHOWN IN EXPLODED VIEW ONLY TO
IDENTIFY COMPONENT PARTS.

RECEPTACLE PANEL
7.5, 9.0, 12 KW
BDN SERIES

NOTE: CONTROL BOX IS ONE ASSEMBLY. IT IS SHOWN IN EXPLODED VIEW ONLY TO IDENTIFY COMPONENT PARTS. A7 BOX IS USED ON BDN-75. A8 IS USED ON BDN-90 AND BDN-120.
*FIG. F: NEMA L14-30R IS INSTALLED ON MODEL BDN-75. NEMA 14-50R IS INSTALLED ON MODELS BDN-90 AND BDN-120.
*FIG. H: ONE CAPACITOR IS USED ON MODELS BDN-75 & BDN-90.
*FIG. HH : TWO CAPACITORS ARE USED ON MODEL BDN-120.



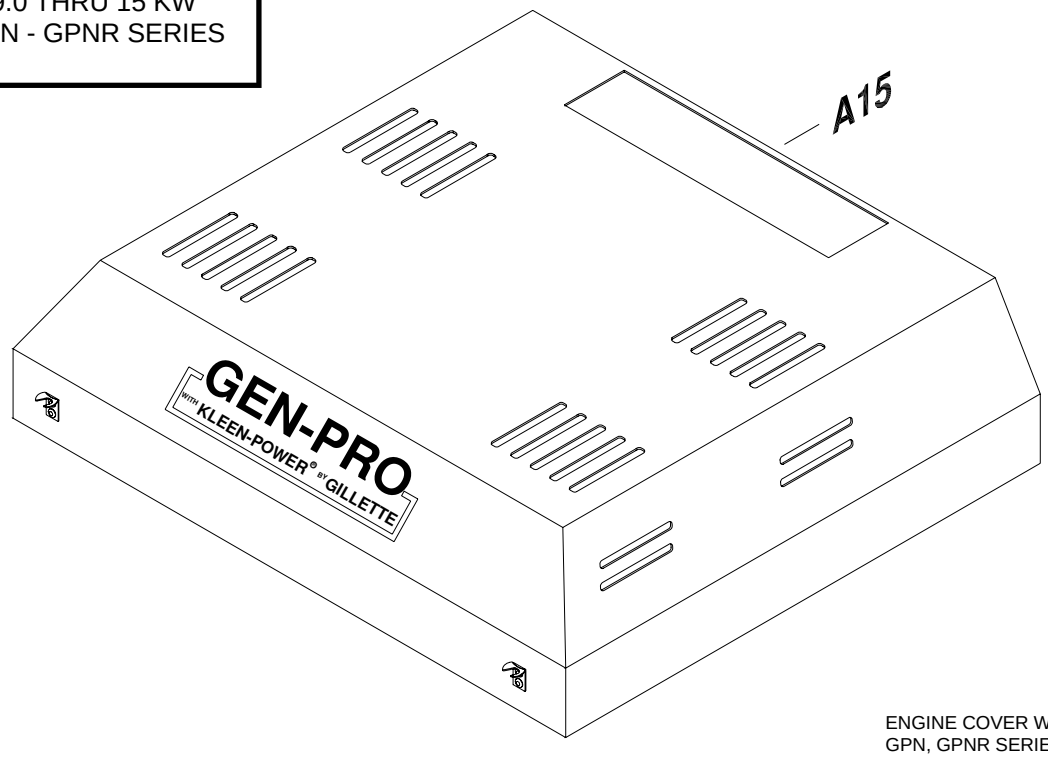
ENGINE COVER
3.0 THRU 7.5 KW
PP, GPN, GPNR SERIES



ENGINE COVER WITH NO INSTRUMENTS,
FOR PP SERIES GEN-SETS.

ENGINE COVER WITH INSTRUMENTS, FOR
GPN, GPNR SERIES 3—7.5 KW GEN-SETS.

ENGINE COVER
9.0 THRU 15 KW
GPN - GPNR SERIES



ENGINE COVER WITH NO INSTRUMENTS, FOR
GPN, GPNR SERIES 9 - 15 KW GEN-SETS

CARRY FRAME AND STATIONARY BASE REPAIR PARTS AND LIST PRICE SHEET				MAXIMUM (STANDBY) KW SIZE AIR COOLED ENGINES							
GPN-GPND-GPNR-PP-EV-BDN2-K2N			LIST								
REF.	PART #	REPAIR PART DESCRIPTION	PRICE EACH ITEM	2200 3000	3500 4000	4500 5000 5500 6000	6500 7500	9000	10500	12500	14000 15000
A	890001	BASIC CARRY FRAME - (PP SERIES ONLY)	118	1							
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	890003	BASIC CARRY FRAME- (PP - GPN-GPNR)	170			1					
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	890004	BASIC CARRY FRAME - (GPN - GPNR)	232				1				
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	890005	BASIC CARRY FRAME - (PP - GPN - GPNR)	170	1	1						
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	890008	BASIC CARRY FRAME- (GPN - GPNR)	265					1	1	1	
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	8900011	BASIC CARRY FRAME- (GPN150EC, GPND-90E, GPND-125E)	265					1		1	1
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	8900020	BASIC CARRY FRAME- (PP - GPN)	190			1					
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	8900022	BASIC CARRY FRAME- (GPNDL-60E)	243			1					
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
A	8900029	BASIC CARRY FRAME- (GPNDL-40E)	243		1						
		(WITH VIBRATION MTS. AND ENGINE CHANNELS ONLY)									
B	210826	ENGINE CHANNEL	14	1	1	1	1				
B	210929	ENGINE TOP BASE	17					1	1	1	1
B	210818	ENGINE CHANNEL	19		1	1		1			
B1	210928	ENGINE BOTTOM BASE	17					1	1	1	1
C	240400	VIBRATION ISOLATOR & HDWR (ENG. END)	18	4	4	4	4	2	2	2	2
C1	240402	VIBRATION ISOLATOR & HDWR (GEN. END)	22					2	2	2	2
C2	210102	VIBRATION ISOLATOR SPACER	12					1	1	1	1
D	201009	ENGINE MOUNTING HDWR	5	2	2	2	2	2	2	2	2
E	270131	GROUND STRAP AND HDWR	10	1	1	1	1	1	1	1	1
F	230000	FUEL TANK (4 GAL.) W/ HDWR AND FUEL CAP	125		1	1	1				
F1	210913	FUEL TANK HEAT SHEILD (4 GAL.)	50		1	1	1				
F2	230400	DIESEL FUEL TANK (4 GAL.) W/ HDWR AND TANK CAP	138		1	1					
F3	210925	DIESEL FUEL TANK HEAT SHIELD (4 GAL.)	34		1	1					
F4	240705	FUEL TANK CAP WITH LEVEL GAUGE (4 GAL.)	26		1	1	1				
F5	240134M	SUCTION/RETURN FUEL LINE W/ BUSHING (4 GAL. DIESEL)	10			1					
F6	240207	AIR VENT W/ BUSHING (4 & 8 GAL.)	12	1	1	1	1	1	1	1	1
G	230011	FUEL TANK (8 GAL.) W/ HDWR AND FUEL CAP	158					1	1	1	1
G1	230411	DIESEL FUEL TANK (8 GAL.) W/ HDWR AND FUEL CAP	170					1			
G2	210988	FUEL TANK HEAT SHIELD (8 GAL.)	27					1	1	1	1
G3	240701	FUEL GAUGE W/ BUSHING (8 GAL. GAS & DIESEL)	45					1	1	1	1
G4	240704	FUEL TANK CAP (8 GAL.)	15					1	1	1	1
G5	240134	SUCTION/RETURN FUEL LINE W/ BUSHING (8 GAL.)	10					1	1	1	1
I	210110	HANDLE AND HDWR, DOLLY KIT (OPTIONAL)	17		2	2	2				
I	210104	HANDLE AND HDWR, DOLLY	20					1	1	1	1
J	210959	PEDESTAL AND HDWR, DOLLY	17					1	1	1	1
K	202072	AXLE AND HDWR, DOLLY	34					2	2	2	2
KL	210745	LEFT HAND AXLE AND HDWR KIT (OPTIONAL)	20		1	1	1				
KR	210746	RIGHT HAND AXLE AND HDWR KIT (OPTIONAL)	20		1	1	1				
L	241103	10" FULL PNUEMATIC TIRE, DOLLY	29		2	2	2	2	2	2	2
M	220001	LIFTING DEVICE AND HDWR	17		1	1	1				
M	210923	LIFTING DEVICE AND HDWR	19					1	1	1	1
N	210958	BATTERY TRAY AND HDWR	34			1	1				
Q	240616	BATTERY HOLD DOWN STRAP	4			1	1	1	1	1	1
R	270821	"SPEED-MATIC" 12 VDC SOLENOID W/ BRACKET	109			1	1	1		1	
S	270908	"SPEED-MATIC" CONTROL BOARD	96			1	1	1		1	
T	270842	"SPEED-MATIC" LOAD SENSING COIL	67			1	1	1		1	
U	440175-1	"SPEED-MATIC" THROTTLE LINKAGE W/ ROLLPIN	4			1					
U1	440175-2	"SPEED-MATIC" THROTTLE LINKAGE W/ ROLLPIN	4				1				
U2	440175-3	"SPEED-MATIC" THROTTLE LINKAGE W/ ROLLPIN	4					1		1	
V	210721	"SPEED-MATIC" ENGINE MOUNT BRACKET W/ HDWR	22			1	1				
V1	210945	"SPEED-MATIC" ENGINE MOUNT BRACKET W/ HDWR	29					1		1	

SPEED-MATIC
ASSEMBLIES FOR
ALL GPNR SERIES

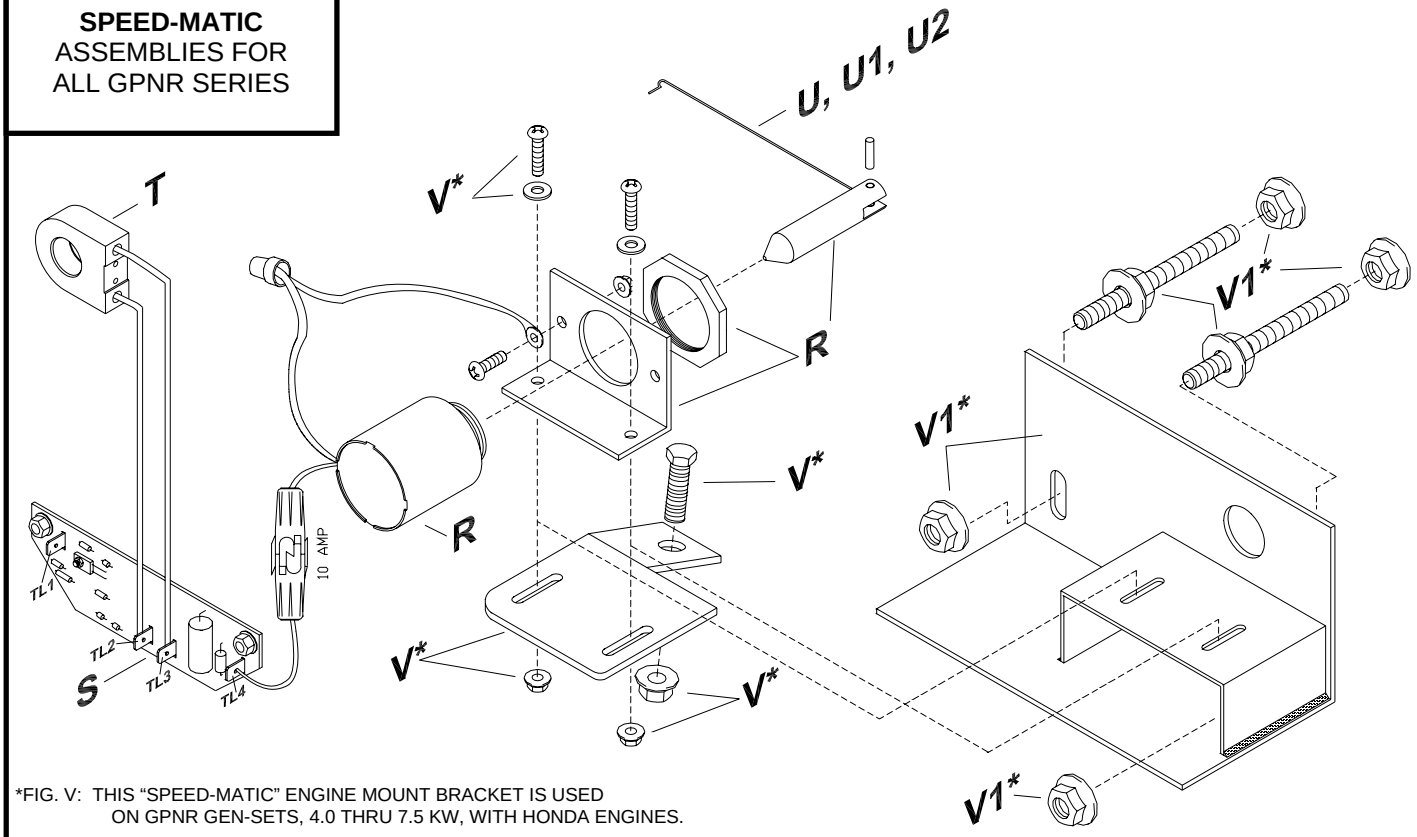
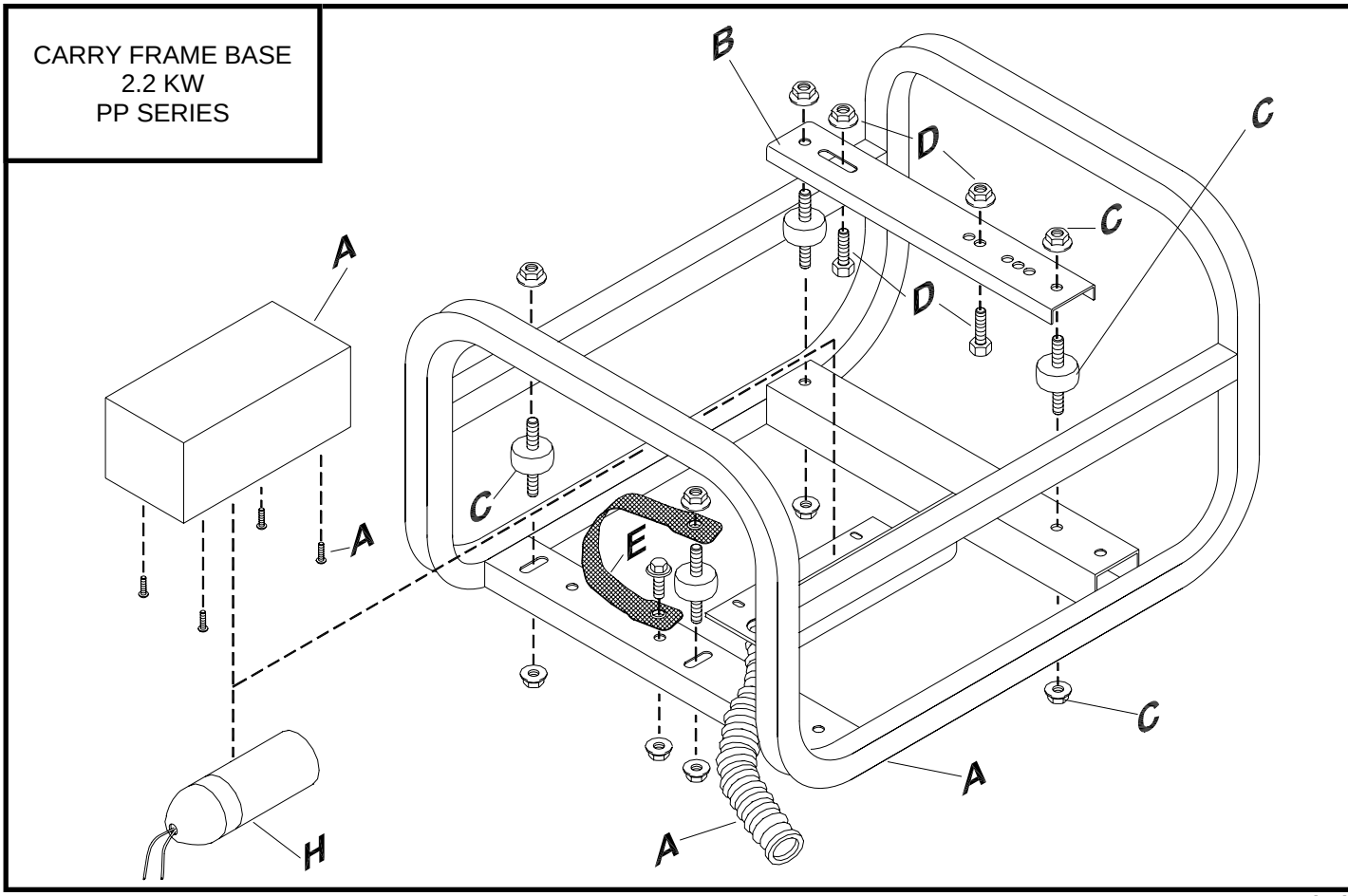


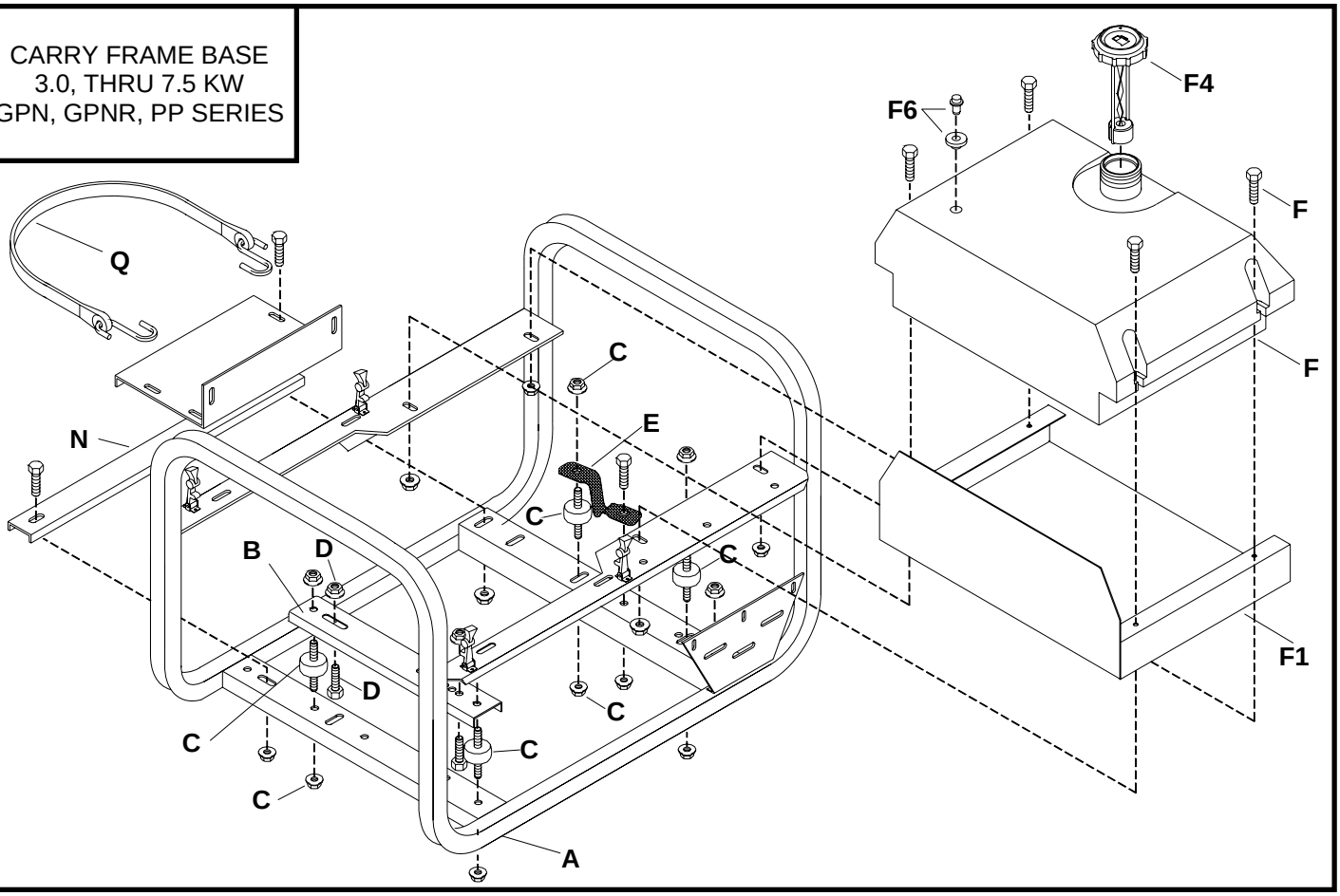
*FIG. V: THIS "SPEED-MATIC" ENGINE MOUNT BRACKET IS USED
ON GPNR GEN-SETS, 4.0 THRU 7.5 KW, WITH HONDA ENGINES.

*FIG. V1: THIS "SPEED-MATIC" ENGINE MOUNT BRACKET IS USED
ON GPNR GEN-SETS, 9.0 THRU 15.0 KW, WITH VANGUARD ENGINES.

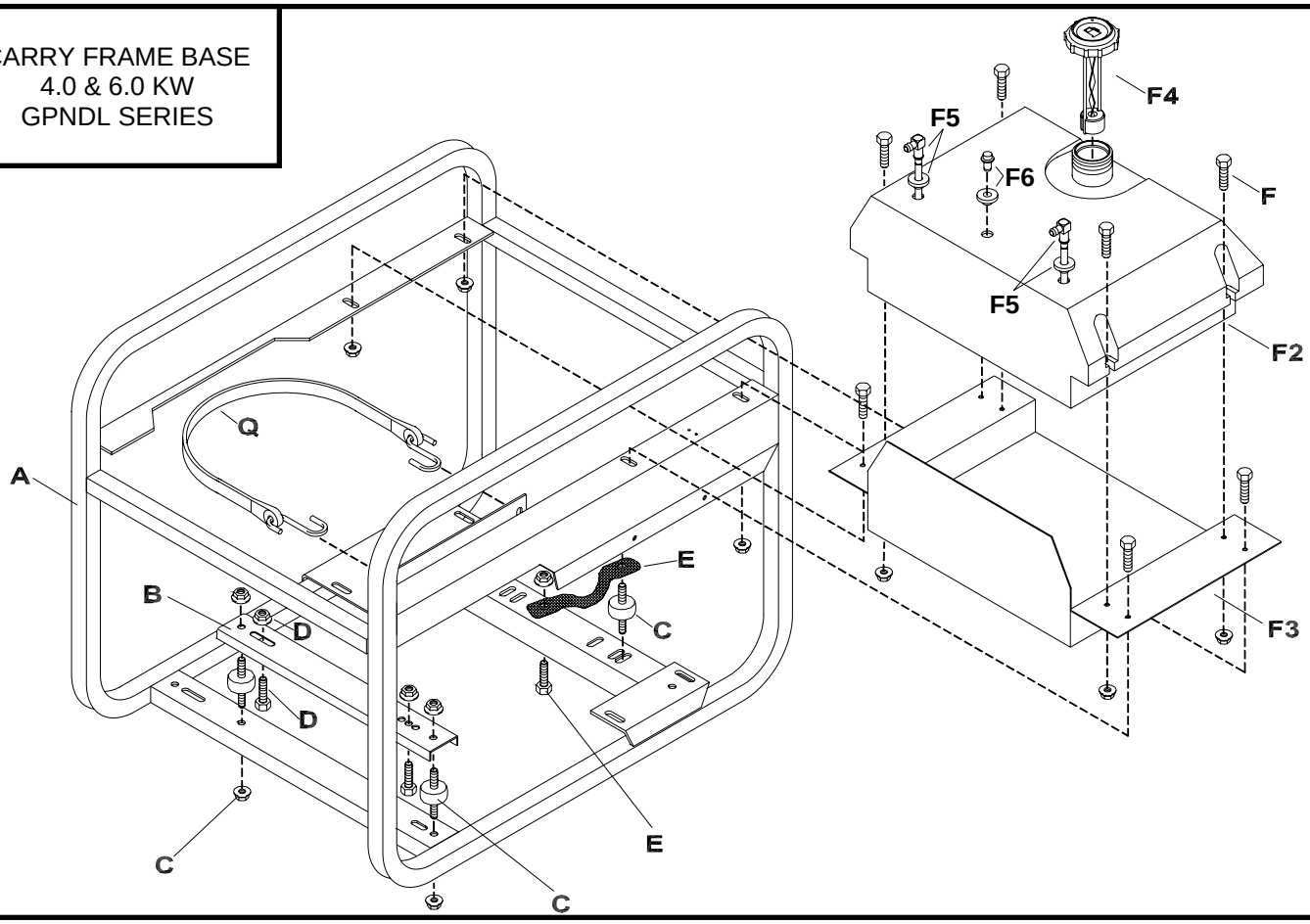
CARRY FRAME BASE
2.2 KW
PP SERIES



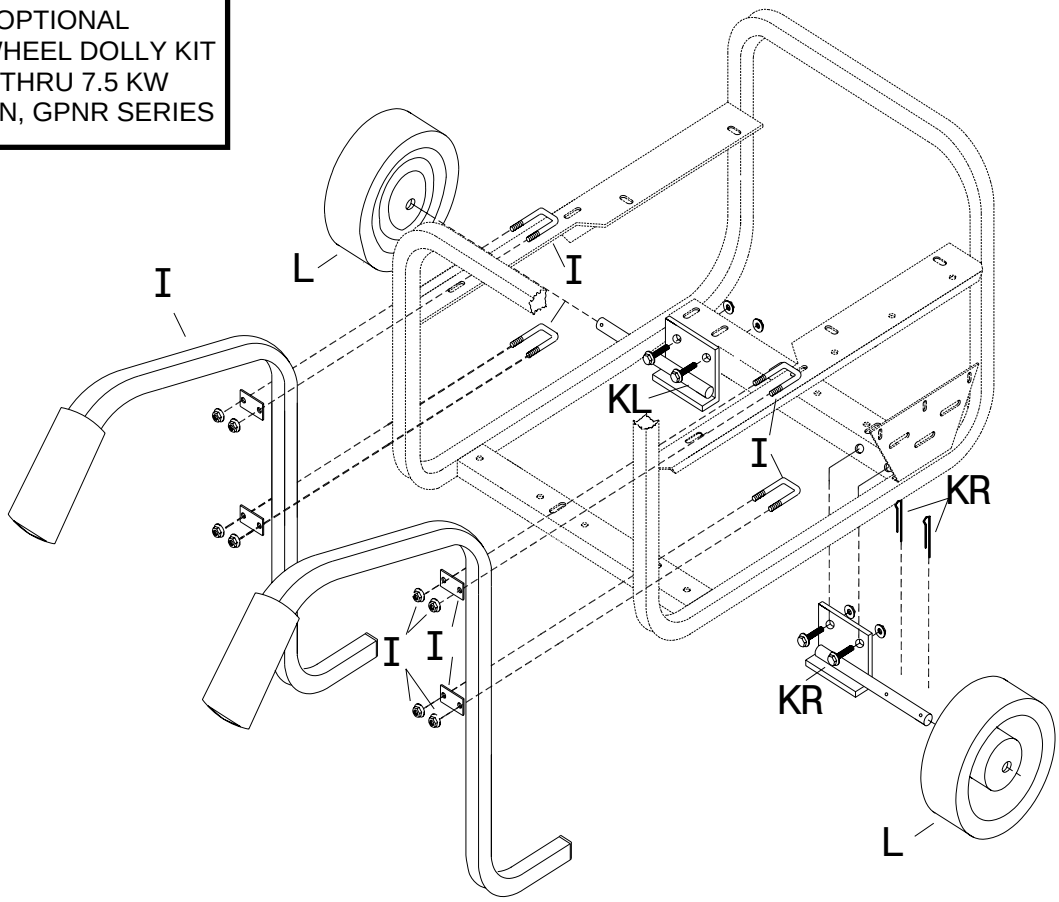
CARRY FRAME BASE
3.0, THRU 7.5 KW
GPN, GPNR, PP SERIES



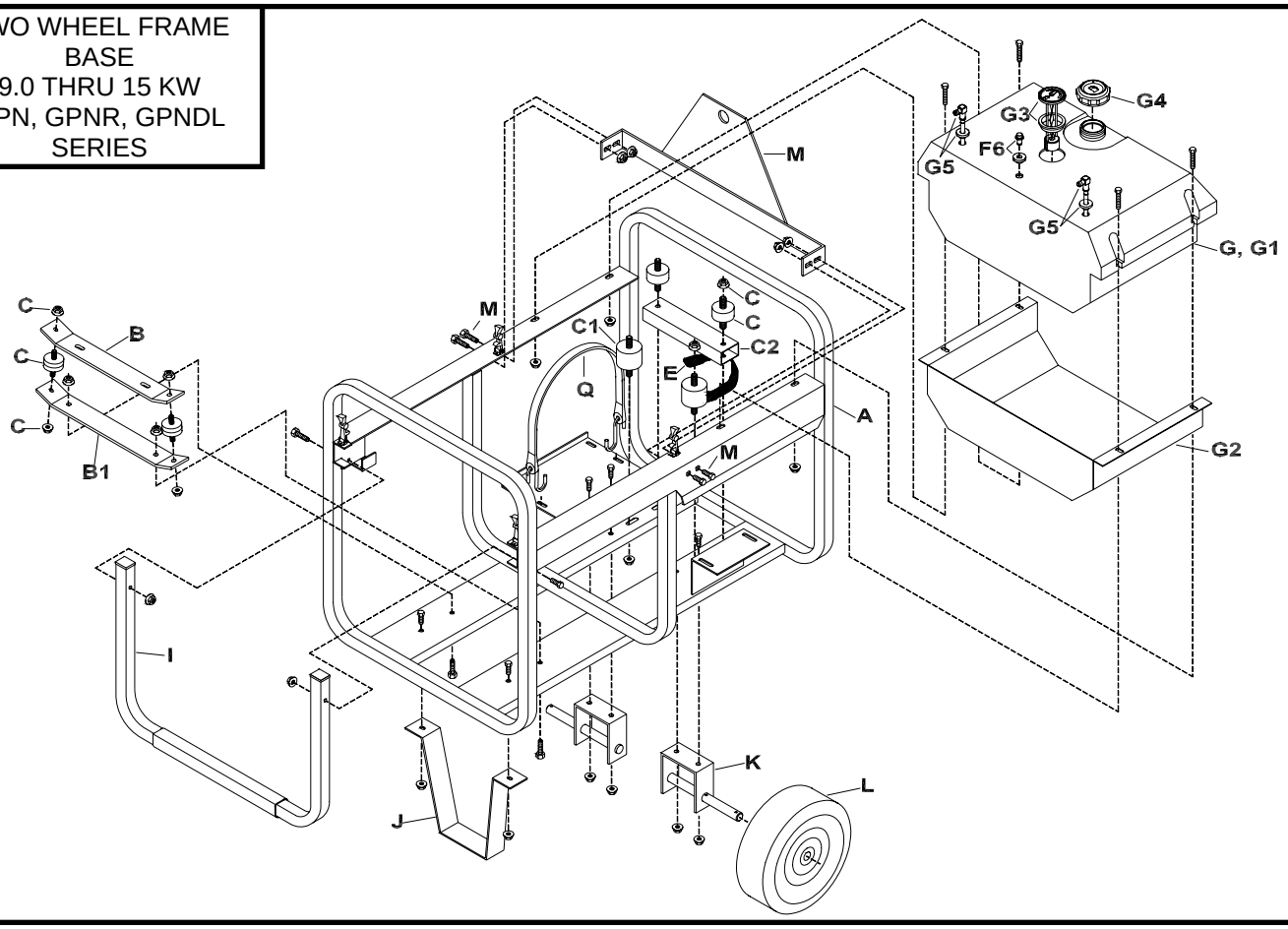
CARRY FRAME BASE
4.0 & 6.0 KW
GPNDL SERIES



OPTIONAL
TWO WHEEL DOLLY KIT
4.0 THRU 7.5 KW
PP, GPN, GPNR SERIES



TWO WHEEL FRAME
BASE
9.0 THRU 15 KW
GPN, GPNR, GPNDL
SERIES



INTERNAL STATOR WIRING DIAGRAM

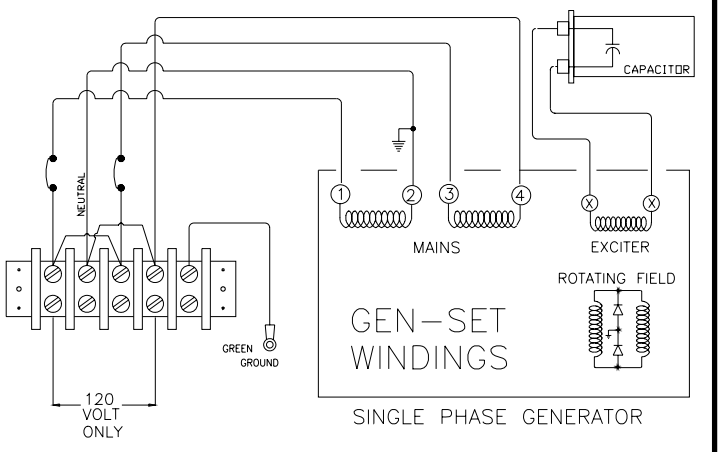


FIGURE A

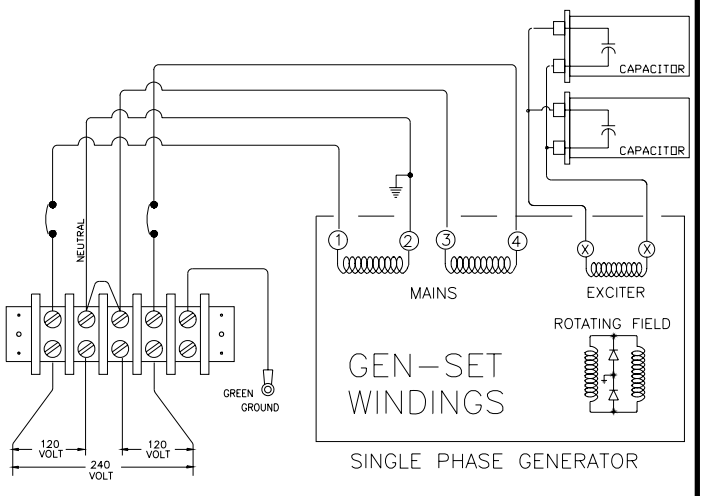
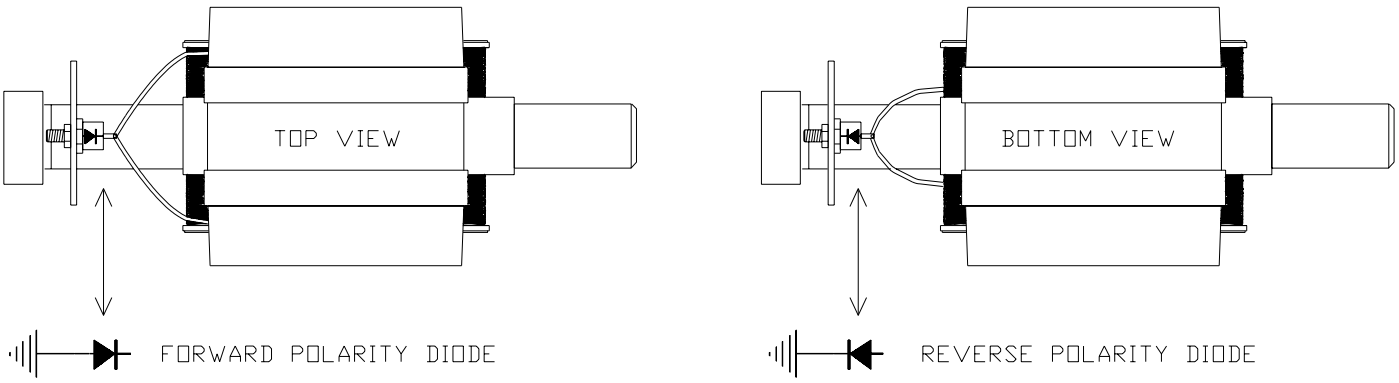


FIGURE B

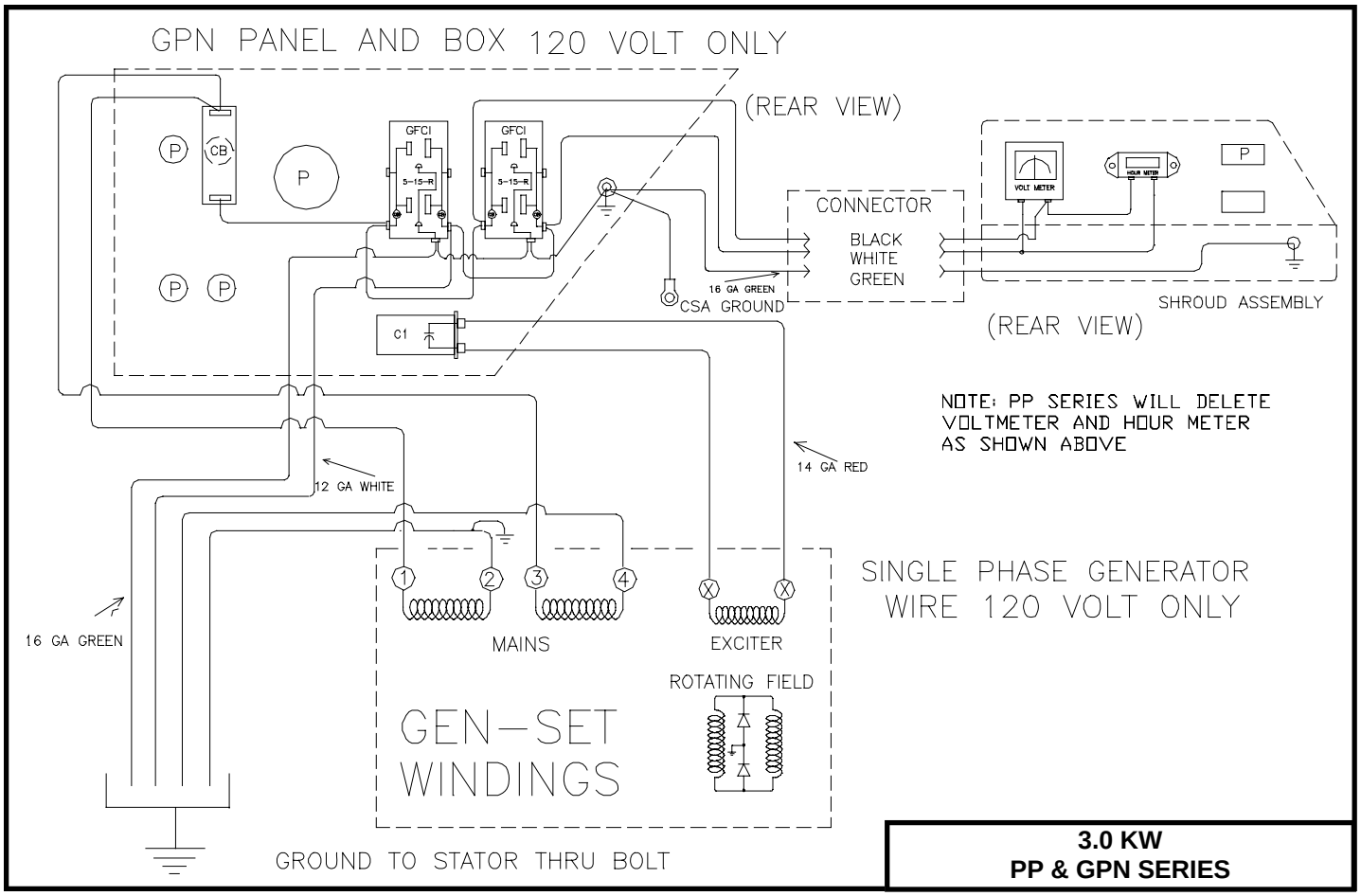
Brushless Generators are of two pole construction and must operate at 3750 RPM, no load speed setting, to maintain 61.5 Hertz. Auxiliary capacitor winding (exciter winding) serves to provide rotor excitation and is placed on top of, and 90 electrical degrees from main output windings. The capacitor provides the voltage regulating function for the main windings. Main winding connections: (A) 120 Volt output only: Connect main winding leads No. 1 and No. 3 together for "HOT" line. Connect main winding leads No. 2 and No. 4 together for grounded neutral line. 120 Volts will be produced from these two points. (B) 120/240 Volt output: Connect main winding leads No. 2 and No. 3 together. 240 Volts is produced at leads No. 1 and No. 4. 120 Volts is produced at leads No. 1 and connection point No. 2 and No. 3. A second circuit of 120 Volts is produced at lead No. 4 and connection point of leads No. 2 and No. 3. NOTE: 10 KW and larger sizes have (2) regulating capacitors.

ROTOR DIODE CONNECTION DIAGRAM

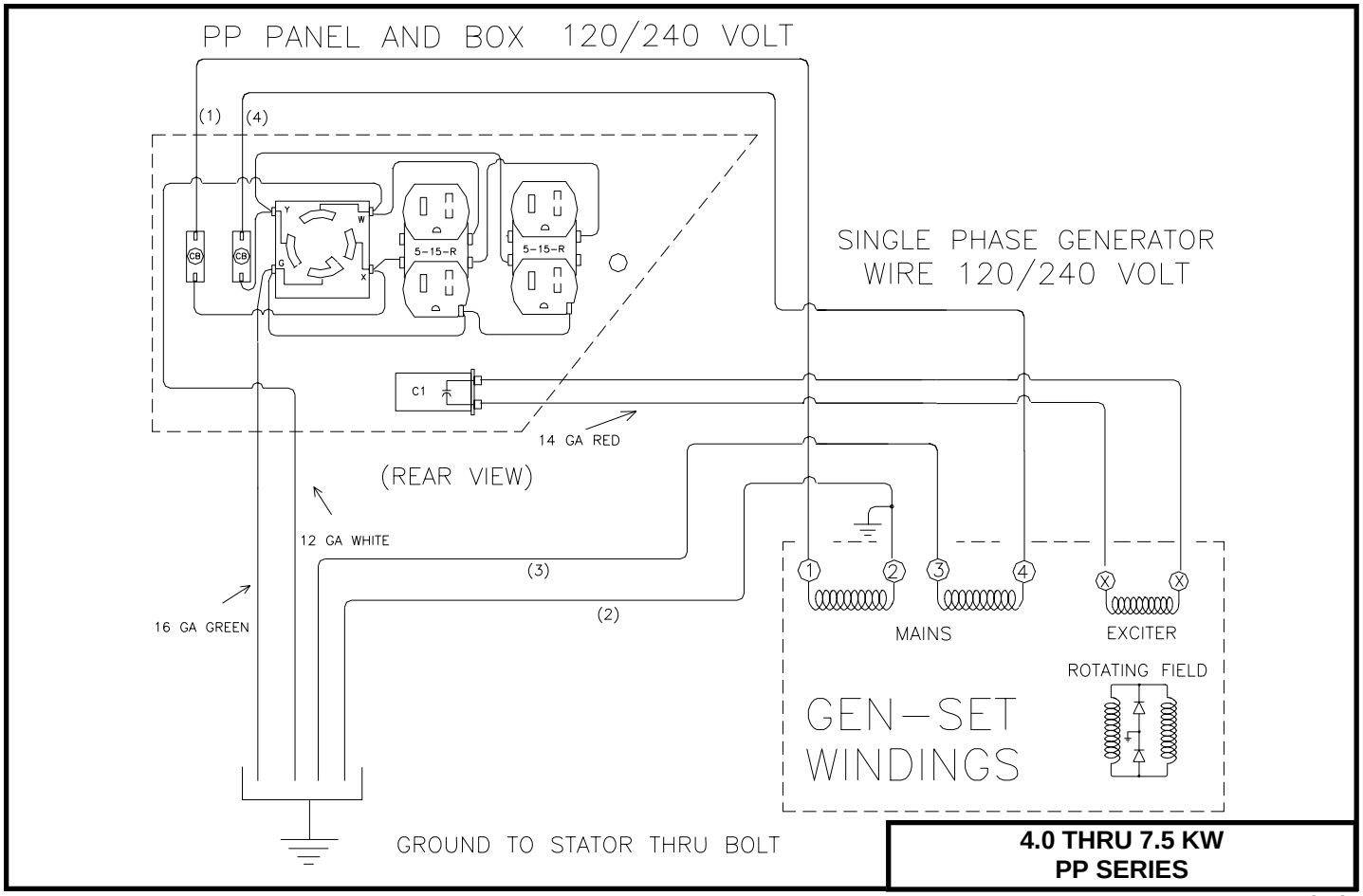


There are two separate coils on each rotor assembly. All rotors, 2.8kw through 7.5 kw have each coil wound with a single conductor copper wire. All rotors 9.0 kw and larger, have each coil wound with (2) conductor copper wires. Locate these conductor wires and determine how they come off and away from these two coils. The conductor wires coming off the very top of each coil (top view) should connect to the forward polarity diode as shown above. The conductors coming off the very bottom of each coil (bottom view) should connect to the reverse polarity diode as shown above on right hand side.

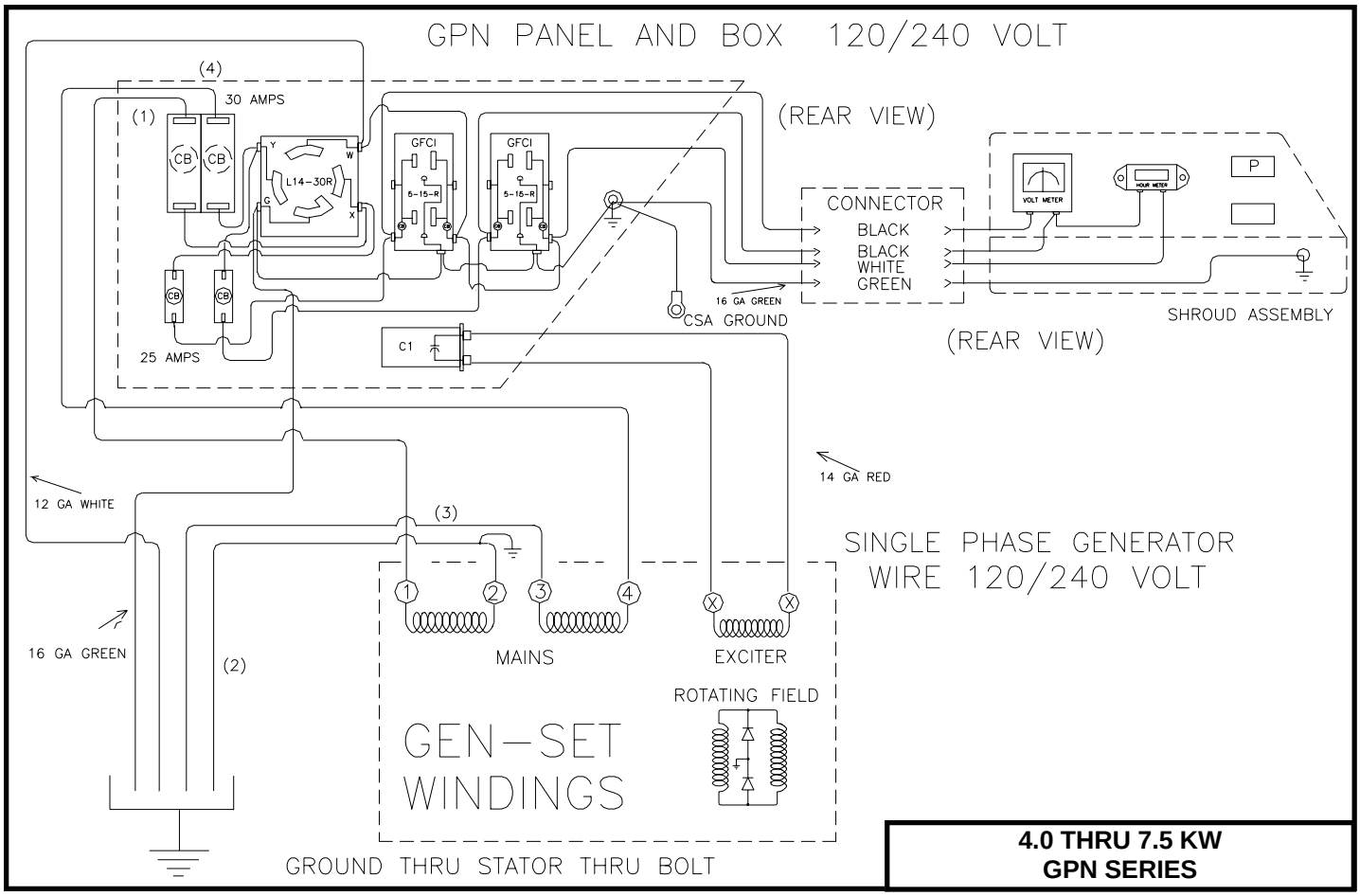
CAUTION: Be very careful when you solder or de-solder wires to the diodes. Always use 60/40, 18 gauge rosin core solder. The repair person must replace original diode with one of the same polarity and having the same original rotor wires attached and soldered to the same diode connection points.



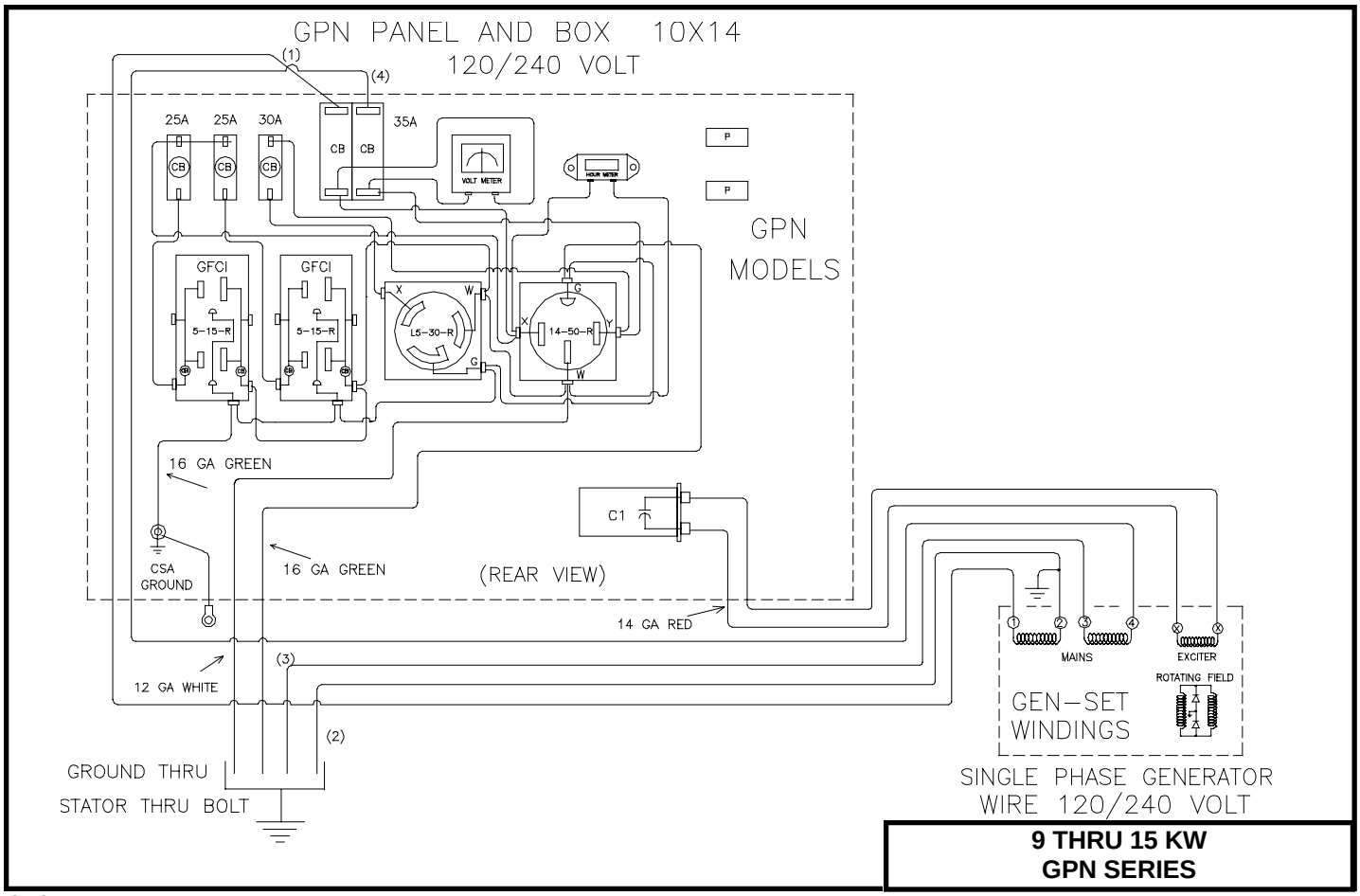
3.0 KW
PP & GPN SERIES



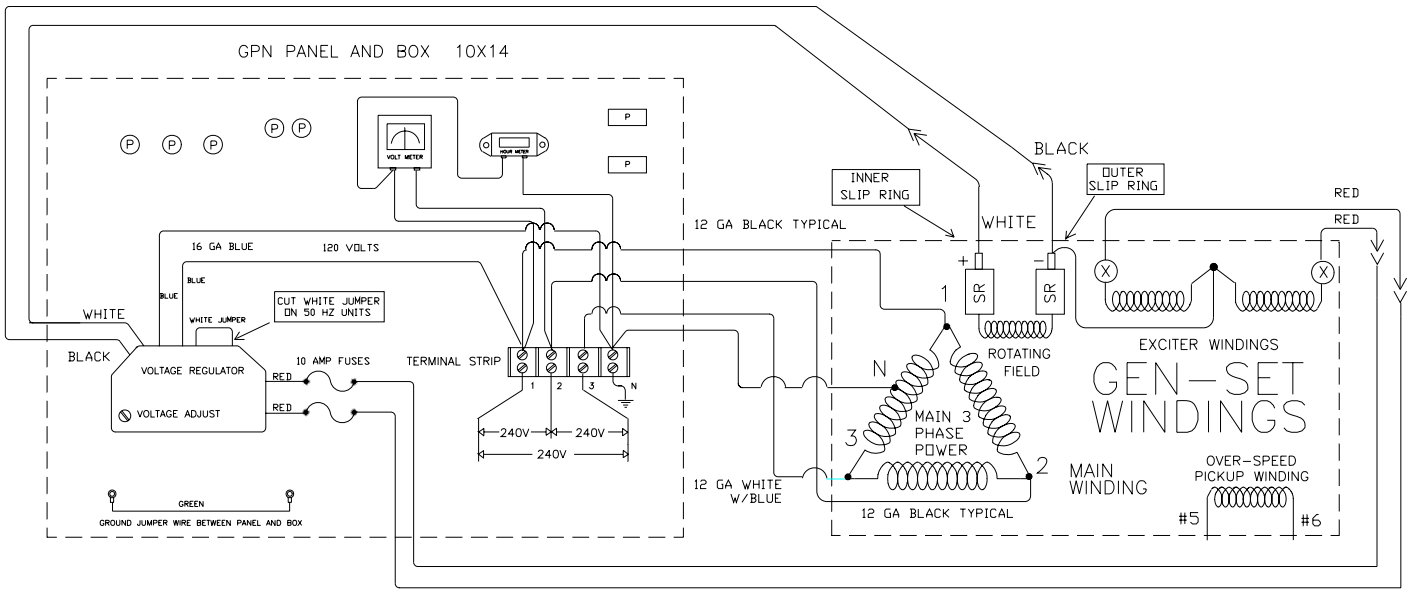
4.0 THRU 7.5 KW
PP SERIES



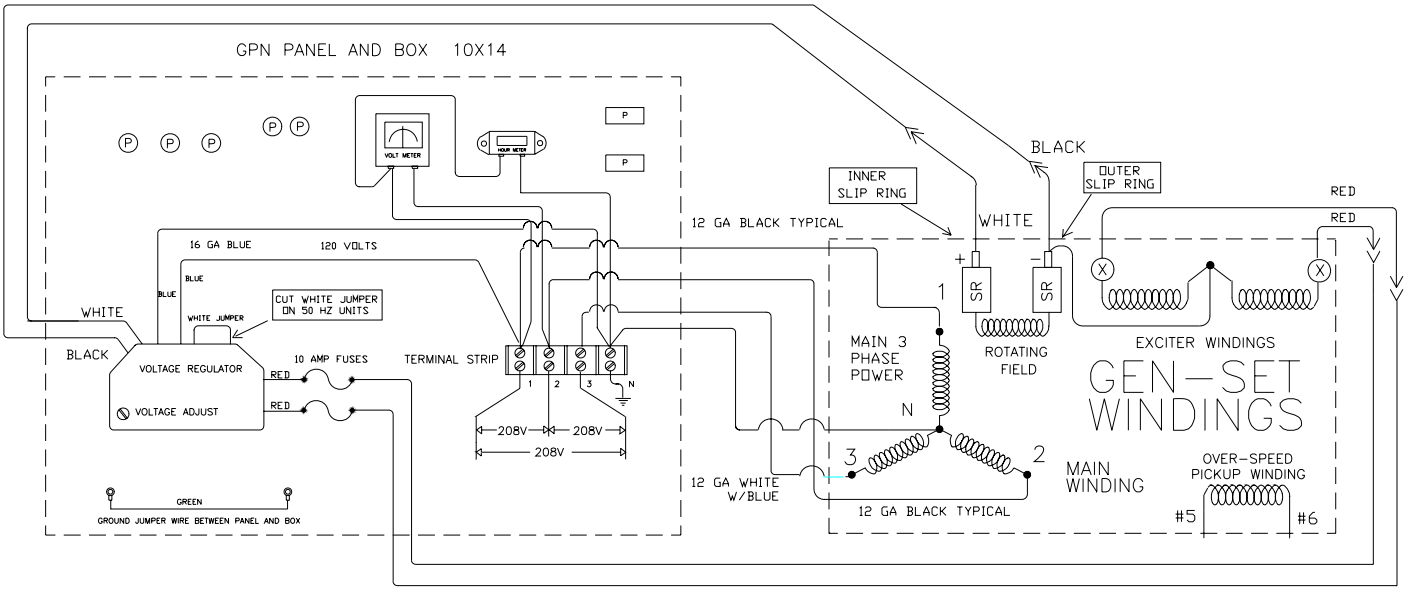
4.0 THRU 7.5 KW
GPN SERIES



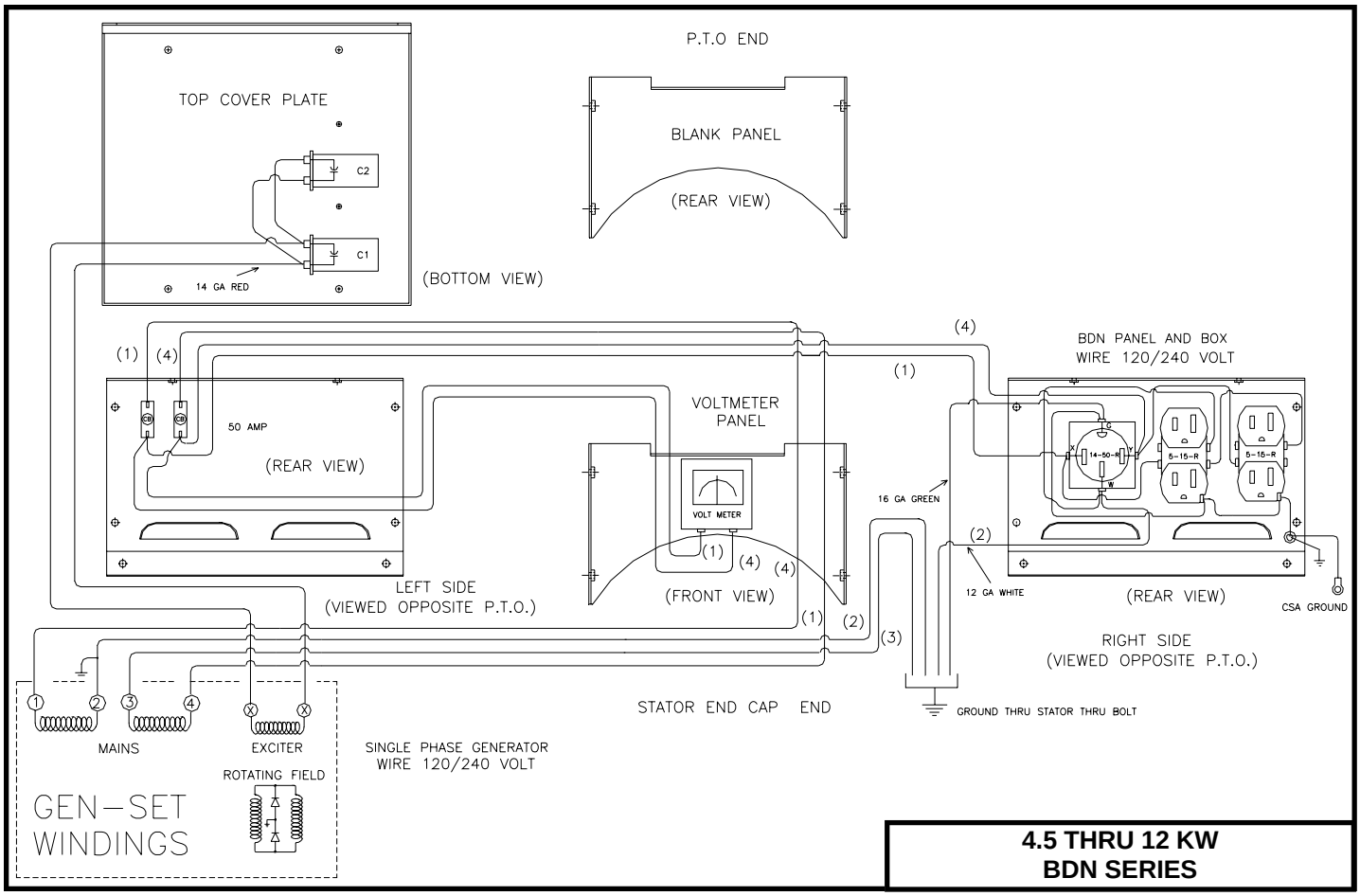
9 THRU 15 KW
GPN SERIES



TYPICAL 240 VOLT, 3 PHASE DELTA CONNECTED WINDING

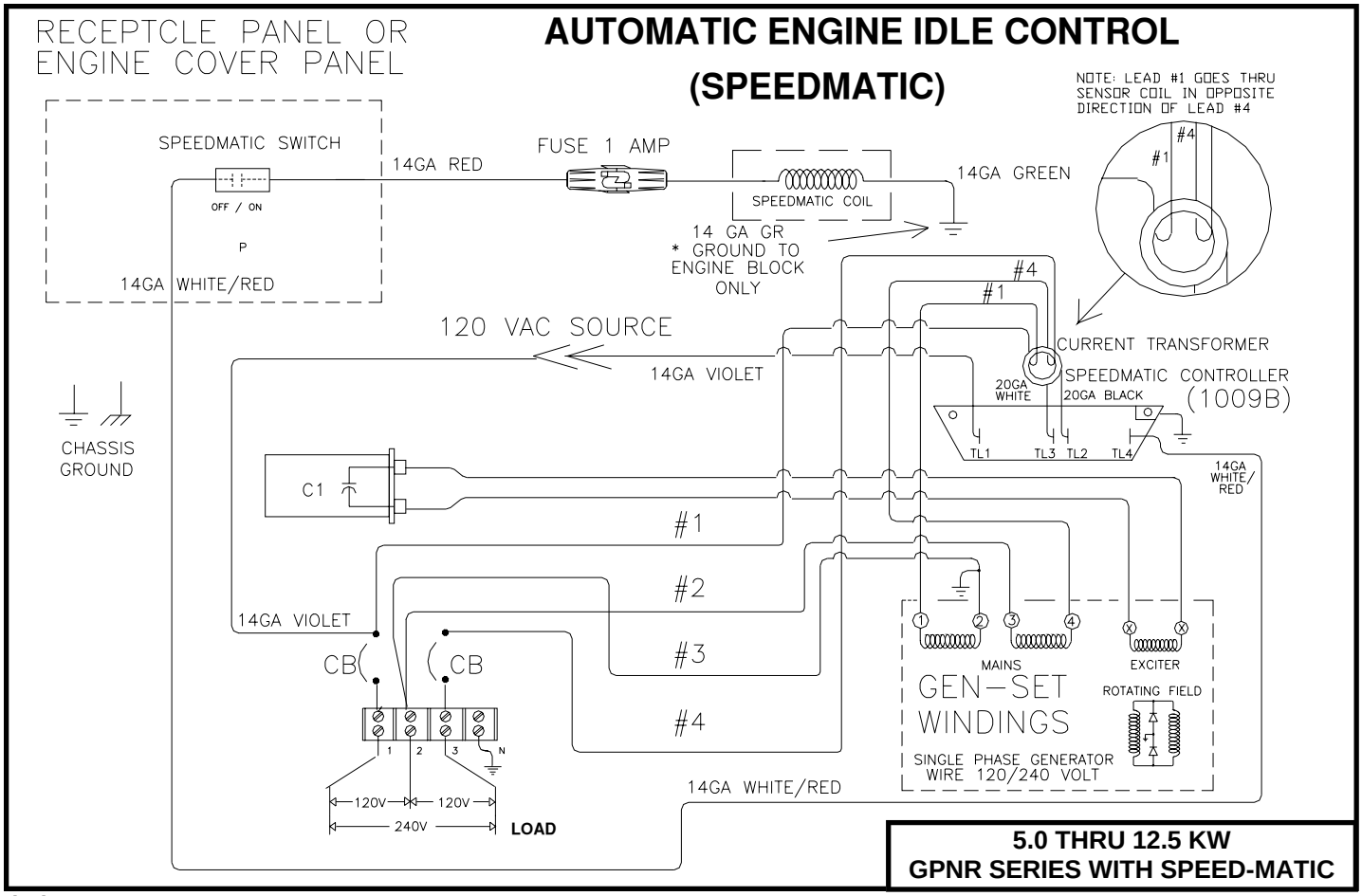


TYPICAL 208 VOLT, 3 PHASE WYE CONNECTED WINDING



4.5 THRU 12 KW
BDN SERIES

AUTOMATIC ENGINE IDLE CONTROL
(SPEEDMATIC)



5.0 THRU 12.5 KW
GPNR SERIES WITH SPEED-MATIC

GILLETTE LIMITED WARRANTY

FOR K2N SERIES AND BDN SERIES GENERATOR KITS, THAT ARE INSTALLED BY ORIGNAL EQUIPMENT MANUFACTURERS (O.E.M.) ON THEIR EQUIPMENT

The Gillette Generator is designed around the latest technology, manufactured and quality inspected by carefully trained and experienced craftspersons. Gillette warrants to the original O.E.M., for the time periods as shown below, that each generator finished product is free from defects in materials and workmanship. Gillette, at it's option, will repair, replace, or offer appropriate adjustments, for any generator part that, upon examination and testing by Gillette's factory engineers or by a Gillette authorized service dealer, is found to be defective, when generator set is properly installed, operated and maintained, according to Gillette's instructions. All transportation costs for parts returned to the factory, and new parts sent back to end user, are to be borne and paid by the O.E.M. This warranty is not transferable and does not apply to malfunctions caused by damages, unreasonable use, misuse, unauthorized repair persons, or normal wear and tear. All warranty cost allowances must be within limits as shown in "Gillette Warranty Policies", procedures and flat rate manual.

GILLETTE PRODUCT	WARRANTY TIME PERIOD
K2N AND BDN Generator kits..... (Warranty is void in prime power applications where O.E.M. generator kit is used as Prime Power, replacing utility power.)	Original Equipment Manufacturer, is responsible to design & build an end product, without endangerment to Gillette generator kits. Unsanctioned generator applications are not warranted. Sanctioned generator applications carry a (1) year limited warranty , which consist of (6) months full parts and labor coverage, (6) months parts only coverage.

THIS WARRANTY SHALL NOT APPLY TO (AND NOT LIMITED TO) THE FOLLOWING:

- Normal engine wear, tune-ups, service parts, including batteries, fuses, and engine fluids.
- Generator kits in trailer mounted use.
- Original installation or start-up costs.
- Damage due to insect or rodent infestation.
- Gen-sets that are altered from original design.
- Failures beyond manufacturers control: Riots, wars, theft, fire, freezing, lightening, earthquake, windstorm, hail, flood, hurricane, and all other external causes and Acts of God.
- Any incidental, consequential, or indirect damages, caused by manufacturers defects, or any delay in repair or replacement of defect.
- Costs due to trouble shooting with jobsite repair person, where no defect is found.
- Costs for equipment (cranes, hoist, trucks) for removal or re-installation of gen-set.
- Diesel engine damage due to constant light loads (wet stacking).
- Prime power applications, where final gen-set is used in place of utility power, on a continued basis.
- Travel expense on any portable generators.
- Any labor time that is deemed excessive, by factory.
- Metal parts, and all other deterioration of parts, installed within 25 miles of saltwater contaminants.
- Overtime labor and overnight freight costs.
- Failures due, but not limited to, normal wear, misuse, negligence, or faulty installations, such as in-adequate fuel lines or gas pressures.
- Travel or labor expenses and all other costs, incurred while investigating performance complaints, unless problem is caused by defective materials or workmanship by Gillette.
- Warranties of associated equipment, not of Gillette manufacture are subject to the individual manufacturers assigned warranties.
- Failure to use and exercise gen-set for long periods of time.
- Parts installed from sources other than engine or generator manufacturer.
- Manufacturer is not responsible for loose connections caused by vibrations during shipment to jobsite. All connections must be checked during start-up.
- All shipments are F.O.B. factory, consigned to the transit carrier. All shipping damage repairs, are between carrier and receiver.
- Any associated costs for replacing components, found to be defective.
- Rental costs of equipment during any warranty procedures.
- Room and board expense due to overnight service conditions.

Any implied or statutory warranty, including any other warranty as to the merchant ability or fitness for a particular purpose or use, is expressly limited to the duration of this warranty. Some states do not allow limitations on how long an implied warranty may last, or the exclusion or limitation of incidental or consequential damages, so the above listing of limitations or exclusions, may not apply to you.

This is our written limited warranty and we make no other expressed warranty. No other identity is authorized to make any different or additional warranties on Gillette's behalf. This Gillette warranty gives you specific rights. You may have additional rights that may vary from state to state.

GILLETTE GENERATORS, INC.
1340 WADE DRIVE ● ELKHART, IN 46514

WARRANTY SERVICE PH: 866-537-4388
WARRANTY SERVICE FAX: 574-262-1840
WEBSITE: www.gillettegenerators.com

GILLETTE LIMITED WARRANTY

FOR STATIONARY STANDBY EMERGENCY POWER SYSTEMS,
STATIONARY PRIME POWER SYSTEMS OR PORTABLE POWER SYSTEMS

The Gillette Generator is designed around the latest technology, manufactured and quality inspected by carefully trained and experienced craftspersons. Gillette warrants to the original end user, for the time periods as shown below, that each generator finished product is free from defects in materials and workmanship. Gillette, at it's option, will repair, replace, or offer appropriate adjustments, for any generator part that, upon examination and testing by Gillette's factory engineers or by a Gillette authorized service dealer, is found to be defective, when generator set is properly installed, operated and maintained, according to Gillette's instructions. All transportation costs for parts returned to the factory, and new parts sent back to end user, are to be borne and paid by the end user. This warranty is not transferable and does not apply to malfunctions caused by damages, unreasonable use, misuse, unauthorized repair persons, or normal wear and tear. All warranty cost allowances must be within limits as shown in "Gillette Warranty Policies", procedures and flat rate manual.

GILLETTE PRODUCT	WARRANTY TIME PERIOD
Portable and Standby Gen-Sets……...(2) Years or 1000 hours (whichever occurs first), from date of manufacture. (Warranty is void in prime power applications)	**Standby:** First year covers parts and labor. Second year covers parts only. **Portables:** First year covers parts and labor. Second year covers rotor and stator only.
Prime Power (Sole power source)……...(1) Year or 1000 hours (whichever occurs first), from date of manufacture.	

THIS WARRANTY SHALL NOT APPLY TO (AND NOT LIMITED TO) THE FOLLOWING:

- Normal engine wear, tune-ups, service parts, including batteries, fuses, and engine fluids.
- Generators in trailer mounted use.
- Original installation or start-up costs.
- Damage due to insect or rodent infestation.
- Gen-sets that are altered from original design.
- Radiators replaced rather than repaired.
- Failures beyond manufacturers control: Riots, wars, theft, fire, freezing, lightening, earthquake, windstorm, hail, flood, hurricane, and all other external causes and Acts of God.
- Any incidental, consequential, or indirect damages, caused by manufacturers defects, or any delay in repair or replacement of defect.
- Costs due to trouble shooting with jobsite repair person, where no defect is found.
- Costs for equipment (cranes, hoist, trucks) for removal or re-installation of gen-set.
- Adjustments to fuel systems or governor systems at time of start-up, or anytime thereafter.
- Excess mileage costs are not permitted. Authorized service provider is limited to 200 mile round trip.
- Diesel engine damage due to constant light loads (wet stacking).
- Travel expense on any portable generators.
- Any labor time that is deemed excessive, by factory.
- Overtime labor and overnight freight costs.
- Steel enclosures, and all other deterioration of parts, installed within 25 miles of saltwater contaminants.
- Failures due, but not limited to, normal wear, misuse, negligence, or faulty installations, such as in-adequate fuel lines or gas pressures.
- Travel or labor expenses and all other costs, incurred while investigating performance complaints, unless problem is caused by defective materials or workmanship by Gillette.
- Warranties of associated equipment, not of Gillette manufacture (auto transfer switches, engines, generators) are subject to the individual manufacturers assigned warranties.
- Failure to use and exercise gen-set for long periods of time.
- Parts installed from sources other than engine or generator manufacturer.
- Manufacturer is not responsible for loose connections caused by vibrations during shipment to jobsite. All connections must be checked during start-up.
- All shipments are F.O.B. factory, consigned to the transit carrier. All shipping damage repairs, are between carrier and receiver.
- Any associated costs for replacing components, found to be defective.
- Rental costs of equipment during any warranty procedures.
- Room and board expense due to overnight service conditions.

Any implied or statutory warranty, including any other warranty as to the merchant ability or fitness for a particular purpose or use, is expressly limited to the duration of this warranty. Some states do not allow limitations on how long an implied warranty may last, or the exclusion or limitation of incidental or consequential damages, so the above listing of limitations or exclusions, may not apply to you.

This is our written limited warranty and we make no other expressed warranty. No other identity is authorized to make any different or additional warranties on Gillette's behalf. This Gillette warranty gives you specific rights. You may have additional rights that may vary from state to state.

GILLETTE GENERATORS, INC.
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